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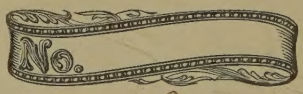

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CONSUMPTION

AND

THE BREATH REBREATHED.

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THE BREATH REBREATHED.

BEING

A SEQUEL TO THE AUTHORS TREATISE ON CONSUMPTION.

BY

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LONDON:
LONGMANS, GREEN, AND CO.
1872.

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PREFACE.

THE theory set forth in these pages is calculated, the author believes, to shed a light on the phenomena of tubercular consumptive disease which the last two thousand years have failed to do. Never were these phenomena rendered thus intelligible before. Each objection has been fairly met and, it is submitted, fully answered. The evidence adduced is in perfect accordance with natural laws, laws which cannot be safely evaded or set aside. Disaster disease and premature death indeed, precede follow and attend us when we disobey them. Nowhere have facts been distorted to meet a theory, on the contrary, the theory is shown to be everywhere in accordance with facts. The evidence in truth is at once direct and circumstantial and, the more closely it is scrutinised the more fully, the author hopes, will its conclusiveness be admitted by each inquiring intelligence and candid mind. It is of pressing moment that it should be so. The great interests of humanity require it. Never per-

haps has anything so important claimed the attention of the profession and the world. For let us consider, it is nothing less than the utter extinction of consumptive tubercular disease which is at issue. And without a doubt, the same strenuous, persistent, well directed effort which has enabled us to cast off so many other ills will, when adequately roused, rid us of this infliction also, the greatest, most devastating and yet perhaps most preventible of them all.

THE AUTHOR.

BELFAST. *February*, 1872.

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INTRODUCTION.

"Quand on entreprend les grandes nouveautés, quand on veut produire une doctrine supérieure à la science commune, il faut s'attendre à se voir contester même la science commune, et le mérite ordinaire est toujours refusé à qui fait preuve d'un mérite extraordinaire."—C. De Remusat, *Revue des Deux Mondes*, t. xviii, p. 20.

"Tout est individuel dans le domaine de l'esprit. Les grandes découvertes ont toujours été faites par des esprits solitaires."—A. Laugel, *Id.*, t. xxi, p. 370.

I entertain no colour of doubt, assuming only the zealous cooperation of medical men and of the intelligent public, that the same arrest might be effected in respect of consumption that has already been consummated, or partially consummated, in regard of smallpox. Unless indeed we assert, which few will be disposed to do nowadays, that evils are made to be submitted to instead of overcome, consumption might and, I maintain, ought to be not only thrust out of our midst, but extinguished over the earths entire surface as well. To compass however an achievement so momentous would need the combined energies of numerous workers, the protracted toil of many years. In view then of a result so desirable the sooner the business is taken in hand

the better, nor can it be a moment too soon. Although most important as an initiative, no single persons unaided efforts can alone suffice. I have indeed striven to do what I could, but except by those who have essayed a similar task, few can well imagine the difficulties toils and hindrances that beset the labourers path. Medical men themselves, it might be alleged, should prove equal to the undertaking. But they are far as yet from being in unison with each other or with me as to the nature of consumption and the origin of the disease. They have besides to toil for subsistence, and the path of the innovator is one not always strewn with roses much less with gold.

We may induce tubercle in the lower animals at will simply by constraining them to respire for a time their own prior pulmonary excreta. A process like this, to be sure, cannot be followed out with regard to human beings but, unhappily, it is nothing the less performed everywhere ready to hand. The faulty defective arrangements of domestic life render rebreathed air and tubercle of only too frequent occurrence. Wherever indeed the former subsists, the latter will not be found long absent. Under such circumstances, in truth, tubercle becomes inevitable. For whenever living beings, man and brute alike, come to respire habitually air some portion of which has been respired before, dead carbonaceous deposits inevitably follow. Hypotheses, mutually subversive and absurd, well nigh as numerous as there are

persons to think and write upon the subject, are to this very moment in circulation. The result of this inevitable deplorable divergency and resultant uncertainty of treatment is that not only are medical men their wives and families implicated, but that the general public is simply decimated.

With reasonable views in regard of the nature and origin of tubercular disease this state of things could not possibly long subsist, and the yearly holocausts to error and delusion would cease to be offered up. So long indeed as we continue to contravene the supreme exigencies of organic animal life, so long must we continue to suffer. The prevalent conviction, fostered and maintained by ignorance and misconception, is that consumption is inevitable as death is inevitable. Never was there a misconception more signally unfounded and untrue. With ordinary attention and care, together with resolute compliance with the not to be evaded requirements of animal organic life, consumptive tubercular disease might, I assert, be avoided with next to unerring certainty and approximate ease.

Holding fast by these convictions, I am bound to further them to the uttermost. Air, the same air, cannot with safety be respired habitually oftener than once. Unbreathed air, that is to say air not breathed before, is absolutely essential to the proper maintenance of healthy life and the sufficient performance of the respiratory act. The prevalent indifference as to this momentous requirement is amazing as it is widespread. The general public

does not know or, knowing, does not care to secure perfectly renewed air, that fluid without which in its purity no living breathing thing can long subsist.* Few indeed feel how essential such air is to the proper permanent maintenance of healthy organic life. The terrible details of the sickening ravages of consumptive tubercular disease, no one can possibly ponder without emotion. No class of the community entirely escapes. Shoal after shoal of victims perishes, to be replaced by yet other shoals to perish and be replaced in their turn. Would only that some diseased and stricken lung, if but for one brief moment, could be held up before those who are so strangely reluctant to admit the advantages and the necessity of a continually renewed perpetually regenerated atmosphere. Materially speaking it is indeed above all things needful, imperatively that air, the same air, shall not be respired oftener than once. Exclusive of out door life and action by day, every provision ought to be made in order that the sleeping chamber atmosphere shall be equal, in point of purity and unprebreathedness, with that without, so that no portion of it shall, at any time, be respired oftener than once by the occupants. This alone suffices, and less than this will not suffice at all but, hurtful in the first instance, proves destructive in the last. I do not here wish to dilate on the virtues, in every way undoubted, of the allotropic modification of oxygen

* Quatrefages, *Rambles of a Naturalist*, Ottos tr., p. 106.

termed ozone.* Like the suns warmth, electricity, the weight and direction of the atmosphere and its currents, we must take it as we can get it. But a pure or relatively pure respiratory medium, we are bound at all hazards to obtain, and realise to the uttermost.

So far from open windows and cornice ventilation affecting us by night dangerously, they are in every respect, proper precautions only being observed, the very reverse of dangerous. Not only is the practice beneficial in itself but, having once become general, it would immensely redound to life and enjoyment, as well as to immunity from consumptive tubercular disease. It is of course imperatively needful that there shall be adequate bed and body coverings, otherwise indeed the practice would not be safe. In these respects it is best to exceed somewhat, to have somewhat too much rather than too little. In any and every case, however, let there at least be enough. The observance of a good habit, one in perfect accordance with natural law, is never prejudicial so long as it continues to be observed, is in fact the precise reverse of prejudicial. The coldest air, therefore, will not of itself hurt, provided only that it shall be exempt from the baleful products of prior respiration. And graduated warmth will not stay

* Der Einfluss des atmosphärischen Druckes, der Temperatur, weit weniger wichtig für die Hygiene ist, als jener des Windes oder des Ozons. Die ozonometrischen Verhältnisse einen ganz besonderen Zusammenhang mit den hygienischen zu haben scheinen. Atmosphärischen Zustand in Paris von Jänner bis Mai. *Archiv für Dermatologie,* Prag 1870, S. 599.

the advances of consumption when the exciting causes are otherwise at hand.

Cold air therefore, contrary to some peoples prepossessions, does not induce consumption, did never once induce it since the worlds beginning until now. I found it not less safe and agreeable, when long years since I began the practice, to respire the open air in my chamber than I do now. Provided only that the person shall be sufficiently protected, there is really no greater danger in inhaling, from the first, the coolest dampest air imaginable, than in partaking for the first time of some wholesome, but else unwonted luxury. The respiration of unpolluted air by night will even go some way to neutralise the evil influence of any vile pernicious atmospheric environment when we are constrained, as we too often are constrained, to breathe it by day. It is doubtless desirable to respire pure air at all times, but at night it is indispensable absolutely, otherwise the protracted inhalation of a pent up stagnant frousy atmosphere eventually brings destruction sure and certain along with it.

Some in truth go almost crazed in respect of the possible risks which, they allege, attend the possible introduction of damps and draughts and chills by night. The mists and fogs, they exclaim, will destroy you, and the night air, as if all air by night were not night air, will do your business in a short time. Never were averments more illusory. Those alone who run counter to natures dictates incur risk, while they who obey her injunctions, if they do not quite avoid, at least incur fewest dangers. How

indeed is air to be renewed if there be no sort of motion in it, no actual current, in short no draught. Draughts as they circle through your chamber by night will not hurt, unless by reason of inadequate body coverings you invite their assaults. It is in fact the absence of currents, the want of some sufficing provision for renewing and replacing the vital atmosphere, that entails destruction and death, in fine the long and dreary catalogue of ills whose redoubtable inflictions no absurd nostrum or cockering, no oil of fish or vipers broth will in the very least conjure away or delay. Rooms, passages, nay entire dwellings there are, where the sordid pent up and entirely evil atmosphere lurks, not merely for hours or days, but even for months and years. How different in truth are such from some that I have known. I would speak in especial of a chamber which I once entered, as I had often before entered it, early one winters morn. It was the sleeping closet of my son. His low trestle bed stood betwixt the severally widely open window and door, while the keen but exquisitely fresh sweet atmosphere from wind swept hills careered through the apartment ceaselessly. The hue of exuberant health mantled over the boys every feature while, bordering the margin of the coverlet, there extended a fringe of pure white snow which the genius of the fragrant night had wafted in all harmlessly during the hours of my childs repose.

The working classes generally, how much more then the indigent the poor, are too often so inade-

quately supplied with day and still more with night coverings, as to render the admission of a fresh unadulterated atmosphere matter of some difficulty. And yet their material resources, were they only properly husbanded, should prove at least sufficient to secure the primary needs of material bodily existence. Next to food, indeed, warmth holds a most important place. The stenchy reeking closeness of the poor workmans ill ventilated sleeping chamber, nevertheless, most miserably replaces an unprebreathed atmosphere and adequate bed coverings. Feathers, instead of being lain upon, quilted between folds of any convenient available material, would desirably supplement the too often threadbare scanty covering, in short constitute a vesture which damp or draught or chill would be found to penetrate never. Rendered thus secure, the continually renewed untainted atmosphere might have freest access into the labourers sleeping place, and with this precaution haply realise for him and his a fund of health and stamina that no after emergency should readily be found to weaken.

The one true and single source of scrofulous tubercular disease has remained only too long undetermined and unknown. It resides, I maintain, in the repeated habitual respiration of an atmosphere some portion of which has already passed through the living breathing organisms of brutes or men. Apart from this, as I assume to show, the cause of tubercle could not possibly for one moment subsist or be. Rebreathed air, then, to wit air already

breathed and breathed again is the real the *vera causa*, indeed the *causa sine qua non* of tubercular consumptive disease in its every guise and form. Hitherto, and until declared by me, the exclusive character of this cause was wholly unrecognised and undetected.* What indeed does a writer of eminence, one almost of our own day, declare. In respect of the causes provocative of consumption, facts rigourously demonstrated, facts which advance science, are wanting almost at every point.† Nevertheless, such facts, I allege with all the emphasis that my most firm and well grounded conviction is calculated to supply, I here as elsewhere set forth adequate, far more than adequate, to satisfy every competent inquirer and candid dispassionate mind. In fine, I undertake to show that the continuous unintermitted inhalation of air deficient in oxygen, charged with the brute and effete residues of prior respiration, is the one exclusive factor engaged in the production of scrofulous tubercular disease, that if we respire such air consumption is inevitable, and that if we do not respire it, consumption is impossible ever.

* *Consumption, as Engendered by Rebreathed Air.* London, Longmans, 1855. The same, second and much enlarged edition, London, 1865.

† Au sujet des causes qui disposent de longue main à cette maladie ou qui en décident l'explosion, les faits constatés rigoureusement, ceux qui peuvent servir à l'avancement de la science, manquent presque sur tous les points. Louis, as cited by Fourcault, *Maladies Chroniques.*

TUBERCULAR CONSUMPTION

AND

THE BREATH REBREATHED.

Nunc igitur quemadmodum percurrimus omnes articulos nobismet propositos in curatione hujus morbi et praeservatione ab illo, hic nostrum sermonem praecidimus. Intellectus autem Largitori laus sit sine fine qua ille est dignissimus et merentissimus. Rhazes, De *Variolis* et *Morbillis, cura* Channing.

If we turn to the pages of Rhazes, which Dr. Greenhills excellent rendering so readily enables us to do, we find him gravely summing up with stating that he has done what he considers needful in regard of the treatment of smallpox and preservation from its attacks.* A yet more formidable malady however than even smallpox continues to baffle treatment and evade prevention. Nevertheless, it has been well observed that as our special knowledge increases, the mind bounds onwards to views more expanded, thoughts more elevated, enlarged philosophical tendencies first assail then complete the destruction of ancient prejudices, while at the same time they disclose the direction which alone can

* *Treatise on the Small Pox and Measles*, Sydenham Soc. 1848, p. 73.

insure discovery.* It remains now to be seen how far, in respect of the treatment and prevention of consumption, I may not arrogate to myself the distinction which Rhazes failed to achieve in regard of smallpox. Briefly, then, disease may be characterised as that condition of the economy which accrues from the continuously prolonged infraction of natural laws, laws all pervasive, laws which cannot with impunity be evaded or set aside. If indeed this dictum be true of disease, in general, it is emphatically so of consumption in particular, consumption which I maintain and affirm is indeed the disastrous result of the habitual persistent contravention of imperative organic functional law.

Consumption, had we only been willing to study realities more, and air our unproductive baseless hypotheses a little less, could not well have remained the well nigh hopelessly insoluble problem which it so long has proved. A reasonable hypothesis to be sure, one involving some measure of substantive reality, is ever useful, whereas hypotheses, at once baseless and irrational unless in so far as they serve to provoke contradiction and elicit disproof, merely bar the way to farther pro-

* A mesure que chaque branche particulière de la science générale fait des progrès réels, l'esprit humain s'empare de vérités plus générales et plus élevées. Owen, *Comparative Osteology*, French ed. p. 8.

Une tendance plus philosophique achève de détruire d'anciens préjugés, et révèle la direction qui seule peut conduire à de réelles découvertes. L'importance de l'observation est sentie et les theories commencent à naître, d'abord faibles et douteuses, puis brillantes de force et de verité. T. G. Saint Hilaire, *Anomalies de l'Organisation*, T. I, Introduction.

gress. Hypotheses, each one more untenable and self contradictory than the other, there are in truth to a perfectly extravagant and bewildering extent. To these, however, I do not here mean to advert further than to touch upon one, baseless and unreal as any, namely that which ascribes consumption to merely hereditary influences. This hypothesis, so far from solving, only evades, does not for a moment grapple with the difficulty. The malady in truth is one of such uncommon prevalence, that consumptive persons must of sheer necessity very often have had consumptive predecessors. We are not, however, obliged to have recourse to so limping and fallacious an expedient in explanation as the supposition of hereditary descent. It is one which we may not adopt. The morbific agent, the only one which, as I maintain, first elicited consumptive tubercular disease in the parent or grandparent, is that which is at work likewise in the stricken offspring. The cause indeed which originates it in the one, is further perfectly competent to originate it in the other also. In the usually alleged examples there are not two factors, but one factor only which is common to both. There is, in this respect at any rate, no relation, as of cause and effect, between parent and child, as the so often invoked and alleged hereditary influence would imply. It is therefore, in reality, no better than moonshine.* Those then who are so fond of ascribing consump-

* Nous n'avons réellement recueilli aucun fait en faveur de l'hérédité de la phthisie. Louis, *Recherches sur la Phthisie*, p. 532.

tion to a grandparent are bound, if they can, to explain how it happened that the grandparent himself came to suffer. It will not suffice, will it, to go back to the first parents of our kind. If not, the pathological crab has to come to a halt somewhere, and then the question as to what occasioned the first individual of the series to suffer, must continue to press home as before. Now, to this extremely pertinent interrogatory the advocates of hereditary influence make simply no response whatever.

Ein alt Weib fiel im Mondenschein,
Der Mondschein mag wohl Schuld d'ran sein,

sings or says some old German saw. When common sense indeed is at a discount, silence perhaps is best, otherwise, and for a moment assuming that consumption is hereditary, I should like very much to ask how it comes to pass that offspring suffer in cases wherein all the predecessors were confessedly healthy. What is sauce for the goose, one would think, might prove sauce for the gander also. If consumption be indeed hereditary, *pari ratione* immunity from consumption, if the argument hold good, ought to be hereditary likewise, which we know that only too often it is not. Whatever, in truth, prove the undesirable legacies handed down by our predecessors, tubercular phthisis at any rate is not one of them.

Yes, it is hard to induce people, some people at least, to think and reason for themselves. They close their eyes to facts the most patent, whenever

they are found to interfere with prior prepossessions.* We are all of us prone to play at the game of follow my leader, in pathology and therapeutics as in everything else, a game which, in this instance at any rate, is found to conduct to very undesirable issues indeed. Galen, who lived about the second century of our era, was fain to study anatomy in the ape, just as persons who pursue hippopathology have recourse to the ass. But whereas the ass furnishes an excellent analogue of the horse, the ape at best is a most imperfect substitute for man. Nevertheless, defective as were his means and appliances, Galens authority ruled with little or no break, and without any further reference to nature, whatever, for a matter of well nigh twelve hundred years. It was not, in truth, until between the fourteenth and fifteenth centuries that a few zealous inquirers, despite of the fanatical prohibition of Pope Boniface the VIII, ventured, in holes and corners now here now there as best they could, to examine the magnificently devised organism of man for themselves.†

Once, when I was a medical student what, in medical euphemy is termed a subject, in other words the corpse of a young man in what ought to have proved the very prime and vigour of his years, was borne into the amphitheatre in order, by actual in-

* C'est ainsi que marchent les sciences physiologiques, il faut cent combats pour faire admettre la vérité la plus facile à vérifier. Pouchet, *L'Univers*, p. 79.

† Haeckel, *Biologische Studien*, S. ix.

spection, to determine the nature of the structural changes that had preceded death. The demonstrator of the period removed the lungs, both lungs, holding them up section by section crammed, so to speak, with tubercles as much as it was perhaps possible for lungs to be. Nothing further was deemed needful, these being present, to account for death. The cause was sufficient, more than sufficient, but so much as a single observation touching the possible occasion of the malady or the truly calamitous circumstance of the premature destruction, in this way, of the noble handiwork of God then lying life bereft before us, our instructor never once took occasion to utter. In fact, the causes of consumption are synchronous with the incidence of the malady, and it is therefore perfectly irrelevant and inconsequential to represent them as hereditary. The *raison d'être* then, the only one, of phthisis is the habitual infringement of the great natural law which prescribes that we shall at no time breathe air deficient in oxygen or any portion of which has been fouled by prior acts of respiration. Other than such fouled and halting air, coupled with its habitual inhalation, there is no actual or possible source of phthisis, and I believe in none. The detritus of degradation, speaking of the dead unoxidised carbon, remains under such circumstances more or less within, instead of being thrust beyond the precincts of the living breathing organism. The only means of explaining what becomes of it resides in assuming its conversion into and, in fact, identity with

tubercle. The effete unoxidised carbon then is tubercle while, conversely, tubercle itself is no other than the effete unoxidised carbon. One condition of things, to wit the habitual respiration of already breathed air having begun, the sequence of the other, namely the deposit of tubercle, follows as matter of necessity. Reciprocally and reciprocally, they explain and account for each other perfectly.

M. Robin indeed aspires to show that the different morbid products, tubercle among the rest, arise from the misdirection, hypergenesis and heterotopia he terms it, of the ordinary constituents of the living organism.* I am not concerned to canvass Robins views in their entirety. Like everything to which their author has attached his name, they demand careful consideration. But what he apparently fails to see, tubercle regarded, is the distinction which we are bound to draw between substances, products, partaking of the life of the organism and others become dead and sere, products which, to its infinite loss and peril as owing to a vice of respiration, are retained within, instead of being ejected from the economy. The effete and retrograde carbon, like some expert of the stage, comes to wear a new guise, put on a quite different exterior according to circumstances and, as carbonic acid is one aspect, so is pulmonary or other tubercle a different aspect of the proteus. If indeed the effete carbon remain unoxidised, it cannot be expelled from the living breathing organism, whereas if only it be duly

* *Programme du Cours d'Histologie,* 2ième éd.

oxidised it cannot be retained within. Tubercle, quoad its formation, is concurrent with the mal-oxidation and insufficient elimination of the effete excrementitious carbon. Properly oxidised, it is excreted without any stasis or remora, whatever, and the dead carbon, sped on the exhaled breath, escapes on wings of air into the ambient atmosphere, and ceases in the very act to cumber the economy any more.

The average air supply subsistent in the chest amounts, we shall say, to two hundred and thirty inches cube, varying more or less with the age sex and vital capacity, as it has been termed, of the individual. Of this air from twenty to thirty inches cube are displaced during each several act of respiration, so that at the end of ten breathings or nearly, the contained atmospheric mass becomes potentially exchanged and renewed,* the inspired air parting with from four to five percentum of its oxygen, which again is replaced by about the same amount of carbonic anhydride otherwise carbonic acid gas, so that between thirty and forty grains of solid carbon, considerably more in the case of hard-working persons, are in this way excreted from adult human lungs. If indeed any portion of the inhaled air be prebreathed air, the dead metamorphic carbon will be retained *pro rata* unoxidised within the organism. The presence of excreted carbon in the breath any one possessed of the merest inkling of chemical science can, aided by an indiarubber bag a little milk of lime and a modicum of sulphuric acid,

* Houghton, *Three Kingdoms of Nature*, p. 198.

determine for himself, but the presence of the non-excreted carbon in tubercle he must realise by a process of reasoning, not less conclusive indeed, aided by chemical and microscopic research as well. But it were better far not to have any tubercle whatever, and, after all, the real and not to be evaded obstacle to this dread deposit, the φῦμα or φῦματα of Hippocrates, of whose real nature we have so long been contented to remain ignorant, is a universal compliance with, and in fact childlike submission to organic bodily requirements and natural law.

We do not, apparently, care very much what species of superstitious folly we house within our breasts, provided only that it shall bear some fine designation withal. Absurd however as this may seem or be, we have the greatest possible objection that any one should presume to interfere or meddle with it. Troublesome inquirers, in times gone by, were treated to invective or the stake. Nowadays, we do not burn, and only sometimes call objectors names. Nevertheless, we have ways and means, hardly less effective than in times of old, of intimidating dissenters and silencing dissent. Absurdities the most flagrant have been only too readily accepted at all times. It needs so little mental effort to entertain them. But when sustained thought and careful investigation are required of us, the case becomes very different, and we prudently hold aloof. We like to hold fast by the throng. All this, it may be said, relates to things of the past. We have become wiser in these latter times. Who, for example,

nowadays, would entertain the belief that a frog could harbour beneath the tongue. And yet a relic of some such superstition appears to be retained in the expressions *ranula* and βάτραχος. Rhazes, we find in his *Liber ad Almansorem*, actually adverts to certain impostors who professed to extract living frogs, which they had had the address to lodge there while they made a preliminary incision, from beneath the organ just specified.* This, however, was an extreme case, one that happened and could only happen a long time ago. Yes, it was better than a thousand years since, we should be ashamed to believe in the like now. Wait a little. Some, nay many among us, are old enough to remember Sir Francis Burdett, that burly baronet, and St. John Long the Irish basketmaker turned physician, whose practice and whose rubbings quite aristocratic females for a time conducted while he, poor wretch, was perishing of phthisis. Well, in a trial connected with the case of a lady, who unhappily had been cauterised to death with the too famous sulphuric acid liniment which many of us used to know a good deal about, Sir Francis swore positively that Long extracted quicksilver from the walls, if I remember rightly, of his Sir Francis Burdetts chest. Now, the ignorance and credulity displayed in this instance, seem to me quite on a par with that which subsisted in the case narrated by the Arabian or, if we go by his birthplace, Persian physician, in respect of the

* Cited by Freind, *History of Physic.*

empiricism of his own time. I here venture on no further illustration. He who runs may read.

If you ask a pathologist what tubercle is, he will perchance reply, readily, that it is a certain deep-seated or, peradventure, superficial tumour which possibly tends to suppuration. You quietly remind him, that you do not ask where it is seated or to what it proceeds, but only what it really is. He will then, it may be, inform you that there are tubercles yellow and gray and miliary, nay fibroid, induced by depressed vital powers, in short a defective decaying tendency in the bioplasm. You rejoin as gently as may be that you do not care a button about their colour or size, and as for depressed vital powers you consider that mere φλυαρία, since you only desire to learn what tubercles actually are. The pathologist now takes himself up a little, as a Frenchman might say, and briskly states that tubercle in fact is a morbid material which, being deposited on the mucous and serous surfaces and in the areolar tissues, destroys the elements which it implicates. In the excess of your courtesy you beg his pardon, and just remark that you do not want to learn where the material in question is deposited or what tissue it destroys, but only what it assuredly is. By this time our pathologists colour becomes ever so little heightened, still, he answers confidently that tubercle, as resulting from a pathological alteration,*

* Tubercule, altération pathologique de quelques tissus qui dégénèrent en une matière opaque friable jaunâtre ou grisâtre, pouvant se ramollir et arriver, etc. etc. etc. *Dictionnaire de Méd. par Bégin.*

degenerates into an opaque, then a friable, lastly a purulent substance, which— But here you boldly interrupt him with the observation that not yet has he replied to your inquiry as to the real nature and essence of tubercle. The pathologist, if he be a candid person, as pathologists commonly are, then confesses, as he might just as well have done at the onset, that he knows nothing whatever, the real nature of tubercle regarded, about the matter.

Seriously, our conclusions in regard of the origin of tubercle are at fault utterly. Every one differs in some respect or other from almost every other one, nor is any unison in strictness possible unless in the direction which I have pointed out. Truly, an incessant mutation goes on in the living breathing organism, new matter, solid fluid and aerial, replaces old, and becomes in its turn eliminated.* Such indeed are the actual and not to be violated conditions of our economy. Even a minute proportion of carbonic acid gas in the air we breathe, air deficient in oxygen and further polluted with offensive respiratory excreta persistently inhaled, sooner or later engenders tubercular consumptive disease. By so much, then, as the oxidation and voidance of the effete interstitial carbon is interfered with and suspended, by so much will its deposit in the guise of tubercle within the living tissues be furthered and accelerated. The ceaseless renewal of the living

* Andral et Gavarret, Sur l'Acide Carbonique exhalé par les poumons dans l'Espèce Humaine. *Annales des Sciences Naturelles*, 1843, cited by Quatrefages, *Rambles of a Naturalist.*

tissues and effective dispersion of the metamorphic waste is the very fulcrum and basis of systemic animal life, the pivot in short on which our material existence turns, and to interfere with or mar the process, as we must needs do when we respire air already breathed, is to court immediate functional derangement and prospective structural decay.* Interstitial molecular decay and renewal are in fact essential to existence absolutely. The transfer of the organising influence from the organising atom it is which, as Freke words it, gives that atoms type its life.† There is in short an intermittent current of material from without to within, from within to without, but under states very different.‡ The two stupendous leading processes of waste and repair, molecular change, tissue decay and tissue renewal, histolysis and histogenesis, destructive and reparative metamorphosis, continue without an instants cessation so long as life itself endures.§ And when they cease, then is our corporeal existence at an end likewise.‖

Respiration involves a process of slow combustion, animal combustion namely, the venous blood or rather the effete carbon thereof uniting with oxygen,

* L'être meurt parcequ'il arrive un moment où le résultat chimique qui est le pivot des phénomènes vitaux, l'échange régulier de la matière, s'affaiblit et devient insuffisant à entretenir les fonctions. *L'Union Médicale*, 14 Fev. 1860.

† Dependency of Life on Disorganisation, *Dub. Med. Quart.* May, 1871.

‡ Freke, *On Disorganisation*, Dublin 1848, *passim.*

§ Simple transformation de forces. Morache, *L'Alimentation*, p. 6.

‖ Mac Ilroy, Unities of the Human Body, *Lancet*, May 1871.

conducted not in the lungs merely, but throughout the entire life endowed organism.* The resultant carbonic acid is found everywhere, not only in the venous but the arterial blood, in the quiescent as well as the active muscles, to the extent of some thirty to forty percentum of the circulating fluid.† In effect, the blood globule constitutes one of the two absolutely indispensable factors that go to make up and complete the respiratory element. Its hue, owing to the iron in its composition, is red, its affinity for oxygen excessive.‡ This is the property which enables it to discharge its function, the final cause of that functions momentous discharge, and our very life and being are bound up with its thorough effective performance.

The consuming exigencies and distractions of life, except perhaps in those whose intellects are very thoroughly roused and disciplined, tend to turn aside attention from the unspeakable moment of alone respiring an ever renewed ceaselessly replaced atmosphere. If the comparatively educated and intelligent be guilty of this neglect, what then are we to expect from the ignorant the illiterate and the entirely untrained. Even professional men, as many a

* Die äussere Athmung, der Verkehr der Gase des Blutes mit denen der Luft, geschieht an allen Stellen wo Blutkapillaren mit Luftschichten in naher Berührung sind. Hermann, *Grundriss der Physiologie*, S. 143.

† Setshenow, as cited by Hermann, *Grundriss*, S. 55.

‡ Le globule rouge constitue l'élément respiratoire du sang. L'hématoglobuline est rouge et possède une grande affinité pour l'oxygène. C'est à cette propriété qu'il est redevable de la fonction. Claude Bernard, *Leçons sur le Système Nerveux*, Tome I, p. 62.

sad example proclaims, do not always prove exceptions. Few, all too few indeed, take up the matter fairly or at all. There are lions, it would seem, in the path. And yet the subject and its applications claim unceasing consideration and development from every one. An ever renewed crusade against the pressing evils induced by the respiration of air already breathed is called for continually. The momentous question of the vitiation of the air of barrackrooms workhouses and livingroom spaces generally, was recently vigorously enlarged upon by Dr. Peters of the Hôtel Dieu, and needs similarly energetic enlargement and discussion everywhere.* The breath of man rebreathed is destruction to his fellows, pernicious to himself as well. How often have I visited chambers fouled, reeking so to speak, with every vile pernicious respiratory feculence, overlooked and disregarded simply because it was invisible.† Dwelling in the midst of such environment, the occupants blood becomes laden with impurities and remains so, while the economy rendered thus unequal to the discharge of one of its most pressing functions gives way sooner or later at every point. There is really no safe alternative, either the carbonaceous excreta must be oxidised and got rid of or they silt up, if I may so express myself, to its inevitable ruin and destruction, within the tissues of the living breathing organism.

Alas, how many things, lifes brief span of action,

* Paris Correspondence, *Medical Press and Circular*, March 1870.

† Sigerson, *Address*, Royal Irish Academy, March 1870.

the paucity of individual resources, the inextinguishable enmity of the ignorant the jealous and the narrowminded, combine to depress and crush the useful innovator and inquirer. Why, the very name of innovator involves reproach. He is an image-breaker, in fact an atheist and if, we do not denounce and curse him in set words, we do so only too often in principle and fact. And yet the able honest persevering and truthtelling innovator is the very hope and mainstay of the world and, did we only know our own real and permanent interests, we should cherish and sustain, instead of persecuting and reviling, him to the uttermost. This then I must and will say that so long as well determined facts and legitimate inferences therefrom remain virtually uncared for and unknown, so long must it prove impossible to make head effectively against the most ruthless unsparing and, I will allege, most entirely and absolutely preventible of all inflictions.

The outward atmosphere, as made up of some seventynine parts azote and twenty one of oxygen with a trace, for it is little more, of carbonic acid gas, is in truth air regarded the very pabulum and indispensable requisite of wholesome organic animal life. Often, only too often, is the air we breathe laden with the winged messengers of disease and death, but never is it freighted with so fatal and entirely subversive a taint as when it proves the vehicle of a sodden and effete, because already respired, breathtainted atmosphere. For to this alone, as habitually inhaled, is ascribable the deadly

virulence which nullifies the virtue of the respiratory act and causes the retrograde carbon to be heaped within, instead of driven beyond the warm precincts of the living breathing sentient organism. The respiration of air already breathed, compatibly at least with human safety, cannot possibly subsist or be. It is in effect a perpetual outrage against the order of nature, a ceaseless invasion of the admirable providence of an allwise God. In the respiratory act indeed properly performed, as in many other things, resides the secret of the Divinity, compassing much with little, realising great results with few, but nothing the less all sufficing appliances. Thus, by means of respirable air, at least air wholesomely respirable, the carbonaceous waste is effectively oxidised and got rid of, animal warmth is maintained, and the blood becomes renewed and pure. But not even the Deity himself, so long at least as he observes his own self imposed law and observe it he does without lapse or fail unswervingly, the causes of disease being otherwise to hand, could avert the disastrous issues consequent on ignorance ineptitude and habitual neglect. It would in truth be just as reasonable to expect that the whole should be less than a part, that black should be white, or two and two count five, as anticipate immunity from suffering and premature decay when the means of averting both are so thoroughly ignored, as I maintain and repeat they are, in respect of the causes that are productive of scrofulous tubercular decay.

In veriest truth what is impossible cannot be, and

seldom or never comes to pass. If the air breathed be not healthily respirable, if it prove deficient in oxygen, or if it abound with the vile products of prior respiration, above all if the dead effete carbon be not duly oxidised and got rid of, then the proper conversion of the dark venous into red arterial blood cannot possibly be consummated, while the not to be tolerated impurities of the living breathing organism are retained instead of being discharged.* The circulating medium, thus left utterly foul and unrenewed, circulates through the economy if not to its immediate, assuredly to its eventual ruin and destruction. But if only the act of respiration be efficiently performed, if the vital chemistry of the breathing act be not tampered with and, above all, if the systemic carbonaceous waste but come fitly into contact with the twenty one percentum of atmospheric oxygen, each and every impurity, the function of the lungs and their appendages regarded, takes itself incontinently away and troubles the economy no more. It is owing then to insufficient general effort, and more especially to a deficient respiratory nisus, aided indeed by halting insight and unwholesome habits, the individual respiring again and again his own breath tainted poisonous excreta, that the proper hematosis of the blood is interrupted, and the otherwise abounding efficacy of the all sufficing and health bestowing atmosphere completely, or all but completely, set at naught.

* Le sang noir n'est point propre à entretenir l'activité et la vie des organes qu'il pénètre, dès que les fonctions chimiques du poumon ont cessé. Bichat, *Anatomie Générale*, Tome I, p. 192.

Contrast these simple sufficing and reliable averments with some others, for example one that has been but recently put forth that tubercle is no other than the result of a ζύμη or ferment, and that it might be induced only fancy by inoculation or the actual introduction of tuberculous matter into the blood. Nothing in truth could well be more extravagant or preposterous. Immense indeed was the jubilation which, in certain quarters, followed the at first seemingly valid announcements of M. Villemin, announcements which some even laid claim to have anticipated. Far from proving well founded, however, they were followed by others pointing to conclusions entirely different from those which the first were supposed to authenticate. In fact, Dubuisson in a second series of investigations, aided by Tillaux Grandcher and the truly candid Villemin himself, inoculated quite a number of animals with various organic matters, chiefly however tuberculous, some of them by the way coloured, with results in some cases nugatory, the nature of the substances introduced not seeming to make any difference, and in all entirely subversive of the conclusions first arrived at. In some of the cases, indeed, there ensued blood poisoning, while in others there was lobular pneumonia, but even when tubercle mixed with sputa was resorted to, tubercular infection did not ensue. Details of these enquiries were laid before the Académie de Médecine.* They totally upset M. Villemins first deductions, but

* *Rapport*, 10 August, 1870.

as to my position that tubercle is no other than the unoxidised and therefore uneliminated effete carbon, they do not impeach it in the very least. Additional evidence however has been adduced, by Waldenburg, editor of a weekly medical journal,* also by Lebert, Colin, Clark, Sanderson, Fox and others. Their researches, indeed, lead to no positive results whatever. Nevertheless, the negative ones are sufficiently valuable, and they demonstrate satisfactorily that tubercle is not the product of a *zumé* or ferment, and consequently that it is not producible by inoculation.

Waldenburg, at least so far as one can gather from his somewhat diffuse outlines, is among those who hold that inflammation is the primary source of tubercle.† The position is hardly worth contesting except in the interest of sounder views, since it is one divested of any basis of reality whatever. Tubercle, it is true, may supervene upon inflammation as on any other morbid state but, if so, it is as *post hoc* not *propter hoc*, the accident as it were but assuredly in no instance the cause. At a recent meeting of the London Medical Society, however, Dr. Andrew Clark set forth that inflammation does indeed engender tubercle, while the late Professor Niemeyer wildly asseverated not only that inflammation was the source of tubercle, but that pneumonia is the ordinary starting point of the deposit.‡ Nothing, pathologically speaking, could well be more

* *Klinische Wochenschrift.*

† *Die Tuberculose, die Lungenschwindsucht und die Scrofulose.*

‡ *Lectures on Pulmonary Consumption,* Bäumlers tr.

unfounded or untenable. Pneumonia bronchitis and pleuritis, whether together or separately, may indeed attend precede or follow tubercle, but do not *per se* induce it ever. Subacute bronchitis so far from occasioning tubercle is, I maintain, infinitely often induced by it, and that with such local and general derangement purulent secretion and local irritation as more than any other concomitant, colliquative diarrhoea and hectic not excepted, to consummate the poor sufferers destruction. Tubercle, though originating in the organism acts, as Lombard of Geneva admitted, in all respects as a foreign body. It is in fact a foreign body and demeans itself as such accordingly. Not only, observes the eminently truthful and conscientious Louis, does observation fail to prove that inflammation is the cause of tubercle, but it proves the very reverse.* Pneumonia, as Bayle in his important treatise pointed out and as recent observers are only too prone to overlook, proceeds from the base to the summit of the lung, whereas tubercle is developed, I would add well nigh invariably, from the summit to the base.† Pneumonia very rarely implicates both lungs, tubercles almost always do. Phthisis is commoner in women than in men, whereas the inflammation just named is commoner in men than in women. Everywhere, indeed, throughout his valuable monograph does Louis

* Non seulement les observations que nous venons de rappeler ne prouvent pas que la peripneumonie soit une cause des tubercules, mais l'histoire de cette phlegmasie nous semble prouver tout le contraire. Louis, *Recherches sur la Phthisie*, p. 524.

† *Recherches sur la Phthisie Pulmonaire*, Paris 1810.

himself iterate these important conclusions.* Nothing, indeed, can be more exhaustive and explicit than are his statements, more perfectly in keeping with the disastrous phenomena of consumptive tubercular disease, or more accordant with my own extended clinical experience and repeated postmortem investigations as well.†

The cheesy looking and yet nothing the less tuberculous masses, oftentimes encountered in the cervical and other regions of scrofulous subjects may, it is satisfactory to know, like tubercle in the lungs and elsewhere be, at least sometimes, absorbed in whole or in part, and dissipated accordingly.‡ This result, which occasionally and only occasionally I have had occasion to verify, is further borne testimony to by Waldenburg,§ Gluge,‖ and others as well. Certain pathologists however, Niemeyer among the rest, go so far as to repeat the extravagant averment that the masses just adverted to, are not tuberculous at all, but something quite other than tubercle.¶ This bold assertion is alike unfounded and untenable. The masses in question, I aver and

* La phthisie peut se développer indépendamment de toute affection inflammatoire du parenchyme pulmonaire ou de la membrane muqueuse. *Recherches* p. 529. Il en resulte que les tubercules étaient la cause et non l'effet du catarrh pulmonaire. *id.* p. 202.

† La phthisie se développe indifféremment chez les personnes sujettes au catarrh pulmonaire et chez celles qui n'y sont exposées. Par conséquent on ne saurait la considérer comme une des suites de cette dernière maladie. *Id.* p. 526.

‡ *Consumption as Engendered* by *Rebreathed Air, passim.*

§ *Die Tuberculose.*

‖ *Atlas der Pathologischen Anatomie.*

¶ *Lehrbuch der Speciellen Pathologie,* Humphrey und Hackleys tr.

maintain, are indeed tubercle and nothing but tubercle. In other respects if tubercle is to be got rid of radically, it must be under circumstances such as are unfavorable to its production, also. Nor does its elimination so much depend upon its actual condition as upon its greater or less chronicity, its amount, the locality perhaps in which it is situated, the state of the contiguous parts,* the more or less favorable position in which the sufferer is placed, coupled with the judgment and skill of the practitioner in whose hands the direction of his health is left. If the conditions be very favourable, recoveries will take place in a larger ratio than many have any conception of.† But how is the disappearance of tubercle to be reasonably looked for, when fresh deposits crop after crop accrue yet more rapidly than old ones can in anywise be got rid of.‡ It is impossible. In Australia where an admirable climate and professional skill abound, phthisis proves fatal absolutely. Out of a thousand cases, says Dr. Thompson, there was not a solitary instance of recovery. All died.§ So long, then, as practitioners turn a deaf ear to the, as I esteem it, certain fact that tubercular consumption is alone engendered by the breath rebreathed, and so long as those labouring under phthisis continue to respire their own respiratory feculence, recovery is simply out of the question.

* Fox, Acute Tubercle, *St. Georges Hosp. Rep.* V, iv, p. 61.

† Tait, Myoidema of Phthisis, *Dub. Med. Quart.* Nov. 1871.

‡ Roche, Art. Phthisie, *Dict. de Med. et de Chirurg. Prat.*

§ Thompson, *Essay on Phthisis,* Melbourne 1871, p. 71. *Australian Med. Gaz.* Feb. 1871, p. 27.

There is a perfect multitude of cases, latent cases indeed, in which tubercle subsists, and yet wherein its presence is never once suspected.* Nevertheless, the immense preponderance of phthisis in our death lists bespeaks, in at least the vast majority of instances, the comparatively easy recognition of the malady. Tubercle, to be sure, is not confined to the lungs, but the functional derangement which it entails in these so important organs, and sympathetic disturbance almost everywhere throughout the organism as well, render its detection, when seated therein, relatively facile. Tubercle however may assail, and does assail, almost any structure† and, primarily or secondarily, implicate almost any function.‡ But wherever it may house, whatever disguise or aspect assume, or structure it may waste and devastate, the frequency of the inflictions of this dread deposit or the contrary will invariably be found to bear the closest possible relation to the greater or less amount of indoor life, sedentary inactive habits, the occupation of stuffy airless living and sleeping chambers,§ briefly the continuous inhalation of air rank with the foulnesses accruing from prior animal combustion and excretion, or of air absolutely pure and free.‖

* Peacock, Pulmonary Consumption, *St. Thomas Hosp. Rep.* 1870.

† Niemeyer, *Lectures on Pulmonary Consumption*, Bäumlers tr. p. 63.

‡ Wunderlich, *Medical Thermometry*. Woodmans tr. p. 410.

§ Addison, *Writings*, Wilks and Daldys ed. p. 62.

‖ Pour préserver l'homme et les animaux des affections tuberculeuses, il faut les soumettre habituellement dans l'état de liberté aux influences de l'atmosphère. Fourcault, *Causes Gén. des Mal. Chron.* p. 24.

Telle est l'influence de l'exercice à l'air libre et de la lumière sur la constitution de l'homme. *Id.* p. 40.

The disastrous spectacle of tubercular maladies, the multitudes whom they snatch from life and hope and usefulness, alike, is in truth heartrending. As for the way in which children, in especial, are in some places finished off, it is simply dreadful. Everywhere almost the deathrate, infantile and adult, tubercular disease regarded, is perfectly appalling. In St. Kilda, where the people scandalously left to grovel in ignorance dirt and wretchedness turn their miserable hovels into soot factories, the general mortality, swoln by the yearly slaughter of the innocents, actually rises to sixty in the thousand. In Heimacy, one of the Westmann Islands on the Icelandic coast, the frightful house atmosphere poisoning as I believe the recently divided funis, tetanic seizures positively carry off the newly born children altogether. In all our large towns, Manchester and Liverpool perhaps especially, the infantile tubercular, to say nothing of the general death rate, is excessively high. During those recent moments when the British Association was asserting the rule of science in Edinburgh and incense was there being burnt to the national idol, scenes were being enacted, doings carried on, soul polluting, body destroying, a reproach to the very name and nature of humanity. In dens, such as those here met with, dens bereft of every appliance of civilisation and decency, the frail tenure of mans poor life, subject to such overwhelming ills, is only too quickly shattered and destroyed.*

* *Daily News, Alison on the Condition of the Poor, Weekly Scotsman.*

Tuberculosis and tubercle, whether in the infant or adult, confined apparently to one portion of the living organism or extending to many, is nevertheless I maintain, preventible wholly. We behold in truth the unvarying absence of tubercle whenever and wherever, sleeping waking and always, the air inhaled is effectively sweet and pure, just as *conversis rebus*, we witness the inevitable supervention of tubercle when the atmosphere habitually breathed is at once deficient in undefiled oxygen and laden with the dejections of prior respiration. The deduction is easy, the inference in fact is irresistible. What would objectors have. If the window or windows, or some equivalent ceiling or cornice air inlet and outlet be not left more or less open by day and by night always, the fouled and scanty atmospheric supply cannot be replaced, and evil sequences are inevitable. In effect, the house we dwell in, as at present ordered and constructed, is the great destroyer of our kind. We shut ourselves in, to be sure, but then we exclude the air also. In these regions, at any rate at least until Astraea return again, we cannot live habitually out of doors, but need we therefore confine ourselves to closed up holes, recesses charged with our own poisonous and utterly irrespirable excretions.

In a communication hailing from Dorchester, Massachusetts, with which I was favoured by Dr. Edward Jarvis, there is a table of the relative frequency and progressive decrease of phthisis as from north to south in the different States comprised

in the American union. In the year ending May 1860, the ratios percentum of deaths from phthisis, as included in the recorded mortality of the several States from Maine to New Mexico inclusive, were as follows. In Maine the ratio omitting fractions of deaths from phthisis, was twenty nine per centum, in New Hampshire it was twenty six, in Vermont twenty nine, in Rhode Island twenty four, in Massachusetts twenty three, in the District of Columbia twenty two, in Connecticut twenty one, in New York and Delaware severally eighteen, in Pennsylvania Maryland, and Michigan respectively seventeen, in Minnesota and California each fifteen, in Kentucky and Ohio each fourteen, in Wisconsin thirteen, in Indiana twelve, in Virginia Oregon and Iowa severally eleven, in Tennessee and in Illinois ten, in Missouri and Kansas each eight, in Louisiana and North Carolina severally seven, in Florida six, in Utah Alabama Texas and Mississipi respectively five, in South Carolina Georgia and Arkansas severally four, and in New Mexico three.

Thus from this important document it would appear that while in Maine, the most northernly State, the reported mortality from tubercular consumption rose to almost thirty in every hundred deaths, in New Mexico the most southernly, the mortality was only somewhat over three. It would seem to follow then, indisputably, that if people did but live as much out of doors, and admit the free exterior atmosphere as largely into their chambers as presumably do the dwellers in Arkansas and New Mexico, they

would enjoy at least equal immunity from the horrors of tubercular consumptive disease. The North American and the Patagonian Indians, perhaps lightly clad, brave all the rigour of the seasons, whereas the Anglo American too much restricts himself to close stoveheated airless chambers and suffers accordingly. The North American Indian has a deep chest, wide pelvis, and teeth of pearl, the Anglo Americans on the other hand are too often at fault in these and other respects. The φύσις of the Indian indeed is for the most part quite admirable, whereas such lank sallow hollowcheeked flatchested hipless toothdecayed men and women, as I too often encountered in that Newer England, I never saw before or wish to see again. The Indian lives in the open and without, the American lives shut up and within. Such a thing as exercise for the sake of exercise is unthought of quite. As for the manly outdoor games of the English or even the Indian youth, they are no where to be witnessed. In sum, the Indian is exempt from tubercle, whereas the Anglo American pays dreadful toll to this destructive and, as I maintain, utterly uncalled for scourge.

I have repeated a thousand times and, if needful, shall repeat again, that consumption cannot and never does subsist coincident with the inhalation of an atmosphere uncontaminated by the evil products of prior respiration. Things, in truth, are commonly vile or otherwise according to the uses for which alone they are fitted, and those to which we think proper to apply them. And, assuredly, air already

respired, is among the vilest of vile things when applied, as the ignorant the heedless and the wilful apply it afresh, for purposes of respiration, purposes which assuredly nature never intended, and which it cannot really subserve. It has indeed been alleged that there is an exemption from phthisis in proportion to the elevation above the sea level.* But how does this tally with the excessive prevalence of hemoptysis, I speak of hemoptysis as arising from and connected with tubercle,† which so affects the dwellers in Peru. Like the inhabitants of some other cities, the people of Lima, observes Dr. Smith, persist in breathing air tainted by foul smells filth and decay, and, the great elevation of their abodes above the sea level notwithstanding, become, we find, self murderers accordingly.‡ In fact, no elevation, air prebreathed being again breathed, yields immunity from phthisis, and no depression entails it if so be we respire air unbreathed before.

Gypsies in their windswept tents, Canadian settlers in open shanties all beset with ice and snow, enjoy, tubercular inflictions regarded, completest exemption. It is only when these settlers come to dwell beneath impervious ceilings and between four walls that their troubles begin, for then and there the lurking destroyer is at hand, and tubercle begins. We try to exclude the cool outer air but, if we do, we exclude

* Watson, *Lectures on the Principles and Practice of Physic*, 5th ed. Vol. II, p. 243.

† Dr. Peacock, on Haemoptysis, *Lancet*, 23 Dec. 1871.

‡ *Travels*, Cited by Lady Barker, *Travelling About*, p. 191.

along with it our fast firm friend, the pure untainted atmosphere, while we house and take to our bosoms instead that already breathed air which is at once our bitter and unrelenting foe. The keenest coldest air this world knows, if only unprerespired, may be inhaled with perfect safety by every one. Wherever man abides, there also health may be secured and consumption may be avoided, if only rebreathed air be avoided, when we will. Our Arctic explorers, supplied indeed with food and clothes, confronted with perfect impunity the chillest air that ever flowed. Whymper safely slept, he tells us, *sub divo* in chill Alaska, with only a screen to windward, when the mercury in his barometer was frozen hard.* Von Wrangel relates quite a similar experience in respect of the dwellers by the shores of the Arctic Ocean.† But why dwell on such things, freedom from tubercle is impossible utterly so long as human beings restrict themselves to inadequate roomspaces, miserable gobbets of tainted atmosphere, instead of having incessant recourse to those supplies which a bounteous and provident Deity furnishes on every side unstintedly. We do not know or, apparently, care to know, that our sleeping chambers, in regard of air, ought at all times and places to be at one absolutely with the undefiled taint free and wholly unprebreathed outer atmosphere.

The vital efficacy of continually renovated oxygen and, when associated with it, of its allotrope ozone,

* *Travels.*

† *Expedition to the Polar Sea,* Sabines tr.

is ceaselessly pervasive throughout every portion of the living breathing economy.* The breath of man, indeed, is fatal to himself, ruinous to his fellows as well.† The memory of the unfortunate who destroys that wondrous fabric which the Almighty Artificer has constructed with such unbounded skill and care, is properly held up to reprobation, but is no obloquy then to attach to the man who not only condemns himself but his offspring and dependents also, to respire an incessantly vitiated and breathtainted atmosphere, an atmosphere just as nocent in the long run as, if administered, would prove a ten grain dose of arsenic or half a dozen drops of undiluted hydrocyanic acid. We cannot, indeed not through any merely human law but by the fiat of the Divine Lifegiver himself, inhale safely air not merely wanting in oxygen, but further reeking with vilest excretions, organic impurities, in fine, breath tainted and irrespirable utterly.‡ Persistent unsufficingness, quoad the vital respiratory medium, deranges hopelessly in all who are condemned to it the indispensable chemico vital function of the lungs in especial, and of the blood everywhere. The mortality amid coal diggers, great as from various causes it unhappily proves, is yet surpassed twofold by that of the workers in metal mines, the atmosphere of which

* Moffat, *On Ozone*, British Association, Liverpool, 1870.

† L'haleine de l'homme est mortelle à ses semblables. J. J. Rousseau.

‡ Le défaut de l'air vital, l'interruption des phenomènes chimiques, le sang noir dans les vaisseaux, toutes ces causes gênent la circulation. Bichat, *L'Anatomie Générale*, T. I, p. 161.

too often is simply murderous.* The metal miners life spent by day in reeking ill aired caverns far below grass, by night in chambers breathtainted and fouled exceedingly, rarely exceeds in Cornwall some thirty years. Even in contiguous Scilly, both in Tresco and St. Marys Isle, where the climate is genial and the atmosphere of insurpassable purity and perfection, the inhabitants, by reason of their unwholesome indoor ways and the habitual exclusion of the ever freshly renewed atmosphere from their sleeping places, suffer from consumption most grievously. An indoor atmosphere and an atmosphere rebreathed, as ventilation is now conducted, are in effect things convertible. But the outer air cannot very well be rebreathed air, seeing that Divinest Providence bestows on the exhalations from our lungs wings wherewith, heat expanded, to soar above and beyond the zone of respiration and, consequently, beyond the risk of proving hurtful to animal life.

I do not wish it at all to be imagined that I hold the elimination of effete carbon as alone of moment since, next to excreting this, comes the almost equally urgent needfulness of getting rid of the effete and dead azote sulphur lime and phosphorus. Hence ensues the very great desirability not to say absolute necessity, with a view to the proper disposal of the resultants of the ceaseless decomposition and recomposition of the normal tissues, of a superabundance of open air life and action, that life and action which an existence passed within doors

* Hunt, *Mining Records*, Government School of Mines.

cannot possibly adequately permit or supply.* Dr. Parkes seems to think, the momentous matter of tissue change regarded, that voluntary muscular effort has a very close relation with the inlet and outlet of azote.† This conclusion seems to have been well borne out in the instance of Weldons walk of nearly three hundred and twenty miles, within five days, recorded by Dr. Flint.‡ Nevertheless, the glandular and nerve structures along with the involuntary muscles, their decomposition and recomposition, must also cause a very copious elimination, both urea and creatin, of azote.

All this aside, however, insufficient open air life and action prove almost as disastrous to cutaneous and pulmonary transpiration as even the section of the pneumogastric nerve in the neck itself, as Bert and others have shown,§ hinder in effect the proper excretion of the dead and effete waste in general, as of the waste and retrograde carbon in particular. If indeed air as rendered impure by respiration were actually visible, if it could but be seen as thus streaked and tinged with the defunct carbon and other foulnesses coming from the blood, we should be only

* Dès que l'on a placé un scrofuleux dans des conditions atmosphériques convenables, tous les moyens que l'on emploie doivent avoir pour but d'accélérer le mouvement de composition et décomposition de nos organes. Baudelocque, *Études sur la Maladie Scrofuleuse.* p. 512.

† Elimination of Nitrogen, *Croonian Lecture,* Coll. Phys. March 1871.

‡ New York Medical Journal, 1870.

§ Valentin, *Einflüsse der Vaguslähmung auf die Lungen und Hautausdünstung,* 1857, S. 15. *Gazette Hebdomadaire,* 3 Sept. 1869.

too eager to get rid of it. Hence it is, and seeing that we do not adequately shun it or otherwise sufficiently exercise the muscular structures in general or those of the respiratory apparatus in particular, what wonder then that spider waists, contracted and hollow chests, drumstick legs and arms, with copious tubercular deposits generally, should prove in fact inevitable. The born populations of towns, bereft for the most part of the vast resources and desirable alternatives which wealth intelligence and refinement insure, dwindle terribly, their indoor addictions and stationary pursuits, along with the persistent habitual neglect of those personal attentions and observances which reasonably directed prove so conducive to human health and welfare, all go more than half way to meet the disaster fraught approaches of tubercular pulmonary disease. The atmosphere, in short, is so indifferently renewed, room spaces are so exiguous, overcrowding is so general, that it cannot well prove otherwise. Alas the dwelling places of multitudes of English Scottish and Irish people are simply unfitted for swine, much more for the in so many respects divinely endowed creature whom we term man.

The importance of house to house visitation, with a view to mitigate so undesirable a state of things, it would be impossible to overrate. In the course of one single year Dr. Trench, aided by an efficient staff, paid so many as ninety thousand day and sixteen thousand night visits in Liverpool.* If a

* *Annual Report*, Liverpool, 1871.

superintendence thus intelligent were everywhere to subsist, how very desirable it would prove, for everywhere, unhappily, such superintendence is greatly needed. Overcrowding is an ever urgent, never ceasing source of organic functional disease and premature animal decay.* One third of the people of Liverpool, that great town, as recently dwelt upon by Lord Derby, live in average families of six in a single chamber.† Few places, speaking of certain of the inferior localities, leave I think a more depressing impression on the observers mind. On one occasion the health officers, finding it needful to summon a number of persons, actually discovered entire families who, for all that they had but a single apartment to live and sleep in, were not content without also harbouring birds goats and even sheep to poison the air withal. But like undesirable conditions subsist in other places as well. The quite recent disclosures with respect to the condition of the inhabitants of Bethnal Green, in London, are horrifying in the extreme. In Edinburgh and Glasgow swine have been found lodged in the upper chambers of lofty dwellings, while, owing to imperfect indoor arrangements generally the atmosphere is deteriorated otherwise, to the infinite prejudice of the luckless inmates.

The Countess Spencer, in her meritorious outlines, adverting to the present condition of the London poor, speaks of seven eight and even more

* Trench, Overcrowding as a Source of Disease, Brit. Med. Journ. July, 1871.

† Address in Aid of Self Supporting Labourers Cottages.

persons, parents children and casual strangers even, occupying one and the same miserably exiguous chamber.* The late matchbox tax agitation revealed terrible particulars in respect of East London, terrible enough alas before. Much has been done to promote underground sewerage, by the way as conducted an immense mistake, but what is done to promote foul air sewerage coupled with ceiling and cornice ventilation. Can any one then feel surprise, at least any one that sides and goes along with me, if under such disastrous physical conditions, scrofula should be prevalent and consumption a consuming scourge.† Most unhappily, throughout these realms, mesenteric hip and spinal disease, lumbar and psoas abscess, white swelling, strumous caries of the bones, tubercular arthritis, tubercle of the various glands and viscera, tubercular meningitis myelitis and meningomyelitis,‡ laryngeal and pulmonary phthisis, and lastly scrofula, almost everywhere meet the eye of the intelligent compassionate observer. Ignorance the most absolute, alike in country and in town, subsists as to the imperative needfulness of continually renewed pure air supplies. It is a thing to which the people, man woman and child alike, attach no importance or next to no importance whatever. Even as one walks the streets, one

* *East and West*, edited by the Countess Spencer, *passim*.

† L'exhalation et l'absorption se succèdent sans cesse. Jamais la nutrition ne reste inactive. Le double mouvement d'assimilation et de désassimilation dont elle résulte, n'a de terme que celui de la vie. Bichat, *Anatomie Générale*, T. I, p. 25.

‡ Liouville, *Archives de Physiologie*, 1870.

meets in certain quarters, almost at every turn the haggard dirtpoisoned countenance, or encounters it afresh when ones vocations lead one into the miserable foul air tainted dwellings. In the country the peasants casement, perchance some many angled fragment of glass, with that of the petty tradesman in the little towns, perhaps further encumbered with growing plants or casual rubbish, is rarely opened or indeed made to open.

I have at different times and from various quarters received communications bearing on the inevitable incidence of tubercle in connection with the evil habit of respiring air already breathed, and, among the rest, one from Mr. Mulvany of the Navy. By actual observation in the West Indies and Canada he was confirmed, he says, in the conclusion that rebreathed air was indeed the true and real source of tubercular phthisical disease. At Nassau, New Providence, where the negroes and halfbreeds sleep pell-mell *ventre à terre*, consumption, the sweet salubrity of the climate notwithstanding, is it seems of terrible frequency. Mr. Mulvany cites the medical officer in chief of the Spanish forces in Cuba as bearing testimony to the vast prevalence of pulmonary disease among the densely packed military, as contrasted with the lesser prevalence of phthisis amid the civil population of that island.* On the great Canadian lakes and canals the bateaux men, winter and summer, live with their wives and families in the

* Por los estrechos de los cuarteles in mismo habitacion. *Casos y Muertos*, 1853, 4.

little cabins of their boats or scows, every possible air inlet during the cold months being carefully closed, so that the consumptive deathrate in consequence is extremely high. During the winter of 1866, 7, Mr. Mulvanys gunboat was housed in one of the great rivers while the crew, as usual, was berthed below. After five months of this sort of life, a marine, one who had never skated or gone out of doors, contracted galloping consumption. Next winter two others of the crew, men who were shy of the ice and of the keen frosty air, became tubercle stricken similarly. The instances, as the narrator observes, are important from his intimate knowledge of the sufferers, their prior habits health and general surroundings, and, so far as they extend, go to corroborate the position that scrofulous tubercular disease owes its exclusive origin and extensive prevalence to the respiration of air already breathed.

Mr. Clark, who has had a prolonged experience as medical officer on the West African Station, after reciting his confirmed adhesion to my views as to the genesis of tubercle, proceeds in his communication to me to comment on the frequency of phthisis among the negroes, the lungs as he conceives being first implicated by reason of having to sustain the earliest brunt of the necessarily vitiated because already breathed atmosphere.* Dr. Kirkwood contributes analogous testimony in regard of the negroes at Nassau.† The dark skinned men indeed, just like

* *Short Notes of Diseases at Sierraleone*, p. 11.
† Bacot, *The Bahamas*, p. 71.

their white brothers, have a poor opinion as to the virtues of a pure unsullied atmosphere, and in fact, would rather keep it out than let it in. The mortality indeed at one time from tubercular phthisis among the rank and file of the West India regiments was perfectly appalling* and, even so recently as 1867, pulmonary tuberculisation proved of exceeding frequency.† In the East Indies, also, it was extremely prevalent, as how could it well be otherwise where hammocks were actually swung with not more than twentythree inches of clear side space.‡ When one reflects upon such a state of things it arouses a suspicion that it might prove yet more difficult to discover where tubercle is not than where it is.

A properly renewed atmosphere is a matter of such ineffable moment that in order to secure its advantages they would need to be appreciated by every one. This however they cannot be until the real cause of the malady, as I esteem it, shall come to be acknowledged universally. If this great scourge of our race is to be materially lessened, observes a writer on phthisis, we must go to the source whence it flows.§ Very true, but this source the author whom I here cite, does not I submit approach. In a communication with which I was recently favoured by a London hospital surgeon, the writer observes. Before I saw you I had read most of your papers and accepted your views as facts, and only wish that

* *Tullochs Report on the Health of Troops in the West Indies.*

† *Army Medical Reports*, 1870.

‡ Parkes, *Hygiene*, p. 14.

§ Pollock, *The Elements of Prognosis in Consumption*, p. 346.

they were more extensively known both among the profession and the general public. Countless indeed are the lives which are sacrificed, inconceivable almost the inflictions which are ascribable to the ignorance, air regarded, of the needs and requirements of the living breathing organism. And yet the evidence which satisfied this hospital surgeon might also, were people only to ponder it well, suffice to satisfy every one. Just so long then as this immense ignorance and destroying indifference shall subsist, so long I maintain must consumptive tubercular disease continue to assert its murderous sway. And, assuredly, not until a more generous working sympathy with the condition of the suffering many, coupled with a genuine practical insight into and compliance with the divinely ordered laws of mans economy and its actual relations with the investing atmosphere, shall universally prevail, neither can consumptive tubercular maladies and their frightfully subsistent ravages abate nor disappear.

Dr. Blake, editor of the *San Francisco Medical Journal*, writing from California assures me, so much is he impressed with the immense needfulness of air absolutely unprebreathed and pure, that he summers his phthisical patients in the mountains and makes them sleep under the trees. The instances of amendment which he relates in regard of sufferers whom he had subjected to this treatment are of striking interest. Why, I should like to ask, allowing for the difference of climate and altered circumstances, might we not do analogously here both in regard of the

treatment and the prevention of phthisical tubercular decay. In Ireland, with the sweetest and softest atmosphere imaginable, the daily dispensary returns, to say nothing of the long garnered records of the past, betray the direst prevalence, in every revolting abominable guise, of consumptive scrofulous disease. What a list cannot I recal even of medical men themselves, surgeons and physicians alike who, seemingly all unaware that air the same air twice breathed is among the deadliest of poisons, breathed it not once or twice merely but many times and so perished, poor sufferers, accordingly. I speak of those whom I have known, and when I think of their hollow wasted features, now aglow with consuming hectic now pallid and death stricken, what would I not give to recal them to life and hope and action, again, and so for them at least undo the accurst the fatal prepossession that leads any one to imagine that he can with safety respire other than the perfectly pure and previously quite unbreathed atmosphere. The general public as a rule know little and care less about the matter, while as to the professional public, the clear appreciative intelligence of some but serves to bring into yet stronger relief the in this respect much to be regretted indifference and shortsightedness of others.

Often as at break of day I have driven through the streets of some great town, have I looked up at the sleepingchamber windows and found them almost invariably closed. Open windows, indeed, are the exception not the rule. And yet if people do not

open their windows by night, how I would ask are they to obtain fresh air, to live or breathe or thrive. People cannot do well with windows closed, and so far at least as they are thereby constrained to respire air already breathed, they sicken and they perish. The window closed by night, entails greater destruction than sword or gun. It is the most baleful of agencies, the almost exclusive begetter of consumptive scrofulous tuberculous disease. No epidemic, no war, not even wars and epidemics combined slay half so many. How people shriek and lament and exclaim when these destroyers are upon them, and yet with what unruffled complacency and satisfaction do they look upon their stuffy carpeted airless chambers, with closed sashes and casements, which prove the greatest destroyers of all.

The Government sanitary reports, I might single out some few in particular, are full of the most terrible details in regard of the miserable state of the homes of English peasant and artificer. In the lake countries, where the natural atmosphere is as the very air of heaven, the windows are not opened or, in many instances, even made to open. A swivel pane indeed there is which sometimes is thrust a little apart by day, by night never. Once when in the English lake district, where I saw many a pallid foul air poisoned countenance, I was asked to look at a young girl whom I found labouring under scrofulous articular disease, in a word tubercle of the hip. I tried to make the truly anxious mother aware of the serious character of her childs malady, its real nature

and actual origin. But when I further entreated her to carry the young sufferer into the suns light without, and to admit the fresh free atmosphere within, she declined absolutely. Of some repulsive drug she would give what you pleased but, as to renewed air, she would have none of it. And yet during the nights I spent there, the sweet wild winds from the hills about swept without let or hindrance through my chamber, while the dulcet utterances of the adjacent Force,* rising falling now as they have done for many a thousand year, lulled me to repose.

It was once indeed imagined that scrofula, the χοιράδες of the Greeks, and consumption along with it were almost exclusively English maladies, the special appanage in fact of English people. Far from this, however, these maladies extend to other regions, various populations as well. Alas, the rest of the habitable world is almost as much tubercle infested as we are ourselves. Not only is the Swedish peasant, observes Mr. Lloyd, excessively dirty in home and person, but the family further huddle together by night in a single chamber, with the windows almost invariably nailed down, shockingly prejudicial to health.† Their predecessors lived and perished so, as their descendants, unless haply better instructed, through many a circling year doubtless continue to do will in their turn. For thus it is, ignorance and prejudice, handed down from parent to child and from generation to generation, cling like some shirt of Nessus to each hapless sufferer, till they compass

* *Foss*, Norse. † *Peasant Life in Sweden*, p. 365.

his destruction at last. In Russia consumption and scrofula alike prevail terribly. Out of every five thousand deaths at Petersburg, nineteen hundred, Dr. Granville tells us, accrue from phthisis.* Double doors and windows, every interstice being carefully closed with wadded cloth or *voilok*, exclude the current and, along with the close stove or *petch*, render stagnant utterly the stinted breath fouled atmosphere, effectively hindering its replacement from without, and in fine entailing the direful scourge of tubercle from which no class or condition of the community finds escape. In the Austrian capital, indeed, phthisis prevails to such an extent as to have realised for it the ominous designation of *morbus Viennensis*.† Among patients admitted into the grand hospital, masked and latent cases aside, so many as twelve hundred and forty instances of pulmonary tubercle were entered on the books.‡ Even in a single ward so many as thirteen out of twenty two were tuberculous subjects. Every where throughout the city the most utter disregard is manifested for the commonest promptings of sanitary law. Close stoves heat the indescribably stuffy chambers, windows doubly glazed and padded are never opened, ventilation is a thing unthought of, and as for the claims health regarded of the living organism they are treated with unimaginable contempt.

It is much the same, *mutatis mutandis*, in other

* *Travels*, Vol. I, p. 501.

† Wesshalb man die genannte Krankheit mit dem Ausdrucke *morbus Viennensis* belegt hat. Oppolzer, *Vorlesungen*.

‡ Vienna Correspondence, *Med. Times and Gaz.* 1869, p. 240.

cities and localities as well. In a series of articles by M. Constantine Paul in the *Gazette des Hôpitaux*, he dilates on the phenomena of phthisis, as well as on the infinite deterioration, at once local and general, interior and exterior which it induces.* It is stated that in Paris this devouring malady cuts off ten percentum of the entire population, in Berlin seventeen, and in Frankfort twenty five.† These ratios however are exceeded in some parts of America where the mortality reaches the frightful proportion of twenty eight percentum. And thus too it is with sailors in the foul and sordid bunks of merchant vessels, and crowded airless lower decks of ships of war, the crowded sleeping spaces of barrack rooms. The atmosphere in the ladies cabins of cross channel steamers for the most part is deplorably bad, and poor stewardesses plying their vocation therein are only too liable to contract a malady to which, from the frequency and severity of its inflictions, mankind would almost seem for ever doomed. If then indeed the facts which I here adduce, the particulars which I have so often iterated, fail to establish, as of cause and effect, the irrefragable connexion between consumptive tubercular disease and the breath rebreathed, then nothing in this world is susceptible of proof.‡ And yet, candid spirits, minds

* *Gazette des Hôpitaux*, Dec. 1871.

† *Id.* as cited in the *Medical Press and Circular.*

‡ Dans cette exposé tous les faits s'unissent, s'enchainent, et nous offrent les preuves d'une veritable démonstration. Les vieilles erreurs n'arrèteront plus le progrès de la science, et ne seront maintenant propagées que par ceux qui les ont enseignées et qui sont interessés à les défendre. Fourcault, *Maladies Chroniques*, p. 73.

open to the intelligent reception of new truths, are assuredly extant now as they ever were. Not always shall the world submit to batten on ancient prejudices and dictates of thickribbed ignorance, prejudices and ignorance which must perforce give place one day to sounder views convictions less irrational.

If only we take one or more of the inferior animals and confine them in such wise that for weeks and months together they shall be constrained to respire, habitually, their own pulmonary excreta, they will be found to contract tubercle with fatal unvarying certainty, a certainty just as fatal and unvarying as appears the case in the dogs and men confined similarly, I do not mean intentionally, at Lille in Flanders.* The cows in Paris dairies, never suffered to leave their airless filthy stalls, become tuberculous to that extent that it is difficult to find a portion of the pulmonary tissue exempt. Never do the French dairy men, to whom the malady is known as the *pommelière*, hesitate to supply the community with the milk of the poor animals while living, and to sell their flesh for food when dead. Tubercular degeneration, as in my larger treatise I have shown, extends even to the insect world. The *muscardine* and *mortflat* of silkworms are, I believe, no other than tuberculous deposits, implicating the trachea in the one case, the

* L'homme qui reste dans des caves, les chiens que l'on attache dans des tonneaux couverts, sont souvent atteints de tubercules. A Lille, comme dans toutes les villes manufacturières, les professions sédentaires produisent un grand nombre de phthisies, de scrofules, et de vices de conformation. Fourcault, *Causes Générales*, p. 40, 41.

digestive canal in the other. Yet both, as M. Jeannel has shown, are preventible wholly, when sericulture is conducted out of doors, in chambers with windows open day and night, or under open sheds as practised in Japan.*

Now, if instead of dealing with animate beings, we hold a disk or plate over some hydrocarbon flame in such wise that the sufficient access of oxygen shall be interfered with, in a short time more or less unburnt carbon will be deposited. The one procedure, to wit the chemico mechanical one, is as nearly as possible the almost exact facsimile or rehearsal of the other. They are in fact sister processes but with a difference. And were human vision only pervasive enough and penetrating enough, we should as readily and as clearly discern the unburnt effete carbon in the stricken organism within, as we do the unburnt ordinary carbon on the disk without. But where direct vision fails, the investigator reason guided holds the Ariadne clew which, if he only care to hold it, is to guide him through the labyrinth. Tubercle then, whether in the lungs or elsewhere, is simply the dead unoxidised carbon of the living organism. Just as the smut on the disk is the unoxidised carbon of flame, so likewise is tubercle the unoxidised effete carbon of the living breathing organism. Soot, regarded in this light, may be looked upon in a sense as tubercle of the

* *De la Régénération des Vers à Soie par l'Éducation en Plein Air*, Conférences faites à la Faculté des Sciences de Bordeaux, Paris 1869.

chimney, while tubercle in the lungs or other tissues, is simply the soot of the animal economy, in fine a solid residuum or *caput mortuum* induced by respiring air deficient in oxygen and further fouled by carbonic acid and other excreta, resultants of prior animal combustion. When indeed the carbon of degradation is duly burnt off and dissipated, the renovated blood is thereby rendered competent to the discharge of its wondrously multifarious functions,* and tubercle becomes alike impossible and unknown. But as ordinary flame will not subsist, neither will the flame of life itself continue, as many a record sadly tells, in air which once or oftener has been respired by man or brute before. Let it be proved. The test, both in the case of flame and otherwise, is ever ready while the materials are everywhere to hand. If we curtail oxygen in respect of the hydrocarbon flame we have soot. And if we limit the oxygen supply so as to hinder the sufficient combustion of the impurities of the economy, we have soot also, but soot disguised and rendered in some measure irrecognisable by reason of its assuming the aspect of tubercle. I would not press the matter so, but the subject is infinitely too important to be slurred over or blinked, and a full and fair hearing I must and, if it be practicable, will obtain. One species of soot then I repeat and maintain, is as nearly as possible the exact ἀναλογον prototype and counterpart of the other. Oxidise, only sufficiently oxidise the burning flame or fuel and you shall

* Hassall, *Microscopic Anatomy*, p. 80.

have no soot. Oxidise in like manner, sufficiently, the carbonaceous excreta of the organism, and animal soot, otherwise tubercle, you will never see.

Interstitial integration and disintegration, animal life regarded, go on ceaselessly and so to speak for ever. Not for two consecutive instants does the organic molecule remain the same.* It is in fact impossible that it should do so. Absorption and transformation, oxidation and excretion, are imperative conditions of existence, in fine the very *sine qua non* of our organic life and being. We are not to day as we were yesterday and tomorrow, as the Latin poet, with an insight that puts modern progress a little to shame, assures us, will not find us as we are to day. Yes, mother earth in many and various ways is the mother of us all, indeed our *magna parens*, while as to our bodies, as keen witted Ovid tells us, life and death subsist at once and together at the very same moment of time.

et eodem in corpore saepe
Altera pars vivit, rudis et pars altera terris.

Bone and muscle, our every tissue in fine, are included in the whirl of the vital vortex, for such indeed is the very cycle of existence. Genesis and disintegration are followed by more recent integration and a yet again repeated disintegration. The blood in the minute capillaries or, to speak more correctly, the dead carbonaceous particles thereof, burn literally and truly away. But should there prove any long sustained baulk or hitch in the

* La Chaleur et la Vie, Papillon, *Rev. des Deux Mondes*, Janv. 1872.

process, in other words failing the due amount of carbonaceous animal combustion, then do tubercular deposits inevitably and unvaryingly ensue. The entire process is displayed amidst the masses of our population, the tubercle stricken portions of it at least, unceasingly. Towns, as they now subsist, are the graves, too prematurely filled, of the community. The young, the brave, the beautiful and the good, as well as others, fall victims alike to a perfectly needless and quite artificially induced vice of respiration, one indeed no more called for or inevitable *per se*, than were it some conflagration by land or wreck at sea. The preceding statements, the inferences which I have endeavoured to deduce from them must, I submit, be seen one day to be not less fundamentally and irreversibly true than are the results of gravity, itself, or even the very radiance of the day.

Sir C. Lyell somewhere appositely and amusingly remarks that when any novel yet otherwise certain deduction in science appears, the first step objectors take is to assure us that it is not true, the next to tell us that it is wicked and absurd, lastly, and when they are quite shut up and defeated, their ready but sadly disingenuous averment is that it was known long before. I cannot well say which of these positions the verities which I assume to communicate are entitled to occupy, but it seems to me as if I were familiar with them all. How often to be sure were similar pleas dinned into patient Harvey, they were not unheard by Jenner and Laennec, and often have they been hearkened to by many another now

lying still and quiet enough in silent graves as well. Than to be discoverer it were better, so far at least as any outward peace or comfort is concerned, to eat thistles and browse on the common. Each mans hand is against him. The innovator is only fit to be stoned. Error, indeed, has lives as many as any cat, and as any cat, at least as cats are reputed, hard to kill. In fact, it is the natural conservatism of each imperfectly disciplined intelligence, the inertia of every formed but unprogressive mind. And yet, speaking of objectors, the half truth and whole untruth in process of time are fully seen through, and misconception and misstatement reach their term at last. Denial and misapprehension may long retard the acceptance of facts, but cannot do so for ever. Evil indeed would be the worlds plight if they did. Whatever desirable certain thing it is our great good fortune to be acquainted with, was once done battle for, sometimes to the death, by our predecessors. Like them also are we required, by every means at our disposal, to further the cause of truth to the uttermost. This premised, we may, I think with Haeckel very safely concede that the value of a given theory reposes at once on the number and weight of the facts which it explains, coupled with the simplicity and universality of the causes which are assigned in the explanation.* Now, the number and

* Der Werth den jede naturwissenschaftliche Theorie besitzt, wird sowohl durch die Anzahl und das Gewicht der zu erklärenden Gegenstände gemessen, als auch durch die Einfachheit und Algemeinheit der Ursachen welche als Erklarüngsgründe benutzt werden. *Natürliche Schöpfungsgeschichte*, Zweite Auflage, S. 22.

weight of the facts which it explains, together with the simplicity and universality of the cause which it assigns unite, I submit and maintain, overwhelmingly in corroboration of the theory which I have been the first to broach and sustain, and which unravels, as no other does or can, the exact nature and origin of consumptive tubercular disease.

In the year 1855, appeared the first edition of my Treatise on Tubercular Consumption, a treatise in which I essayed to show that the malady was exclusively occasioned by the respiration of air which, once or oftener, in whatever proportion, had passed through the living breathing vitals of man or brute before. The second edition of this work, with fresh proofs and further illustrations, was published just ten years later. Though often contested, the data set forth therein have never been effectively or conclusively impugned, never once proved to be either inexact or unreliable. Founded, as I claim to show they are founded, on nature and on truth, they are, as I believe and maintain, inexpugnable wholly. With few or no exceptions, even in those cases in which my conclusions were hotly challenged and I was even charged with riding my hobby as it was termed to death, the various notices were not only fair but in the main appreciative. In one instance, and one only, was this courtesy infringed. He indeed who writes under cover of the anonymous, evading as he does the ordinary risks and liabilities of acknowledged statements, is bound, one would think, to a peculiar

fairness and even punctiliousness of observance, and if he fail in these, we are prone to draw inferences not precisely favourable. To the anonymous critics detraction in regard of the first edition of my work I replied elsewhere.* With his notice of the second, in the simple interests of humanity and of truth, I shall now proceed to deal.†

Dr. Mac Cormac, for thus the notice runs, may be right in his view that the one cause of tubercle is breathing air which has been previously breathed, though we surely see phthisis in persons and families who as regards the breathing of fresh air are more favourably circumstanced than other persons and families in whom it is not developed, but the profession must have different evidence before it accepts what the author hastens to call Mac Cormacs Law as a scientific dogma. It is no doubt a great convenience when one is able to wield the authority of an entire profession in aid of ones personal averments. But, without disparagement, the critic may here at any rate be fairly called upon to produce his warrant.

Now, his unsustained *αὐτὸς ἔφα* and *ex cathedra* dictum apart, the writer does not anywhere, whether by circumstantial reasoning or direct proof, attempt to controvert the I may well say overwhelming evidence which I adduce. The rules which he lays down for my guidance and adoption, and by which he himself I think might have somewhat profited,

* *Dublin Medical Press*, 1855.

† *Lancet*, 5 August, 1865.

are precisely those which, so far at least as my ability permitted, governed the actual course and conduct of my argument. My opponents conclusion was plainly one foregone, and yet perchance he might have hesitated to maintain it, had he only, in justice to the profession in whose name he assumes to speak, to himself and also to me, taken a little time to master fairly the merits of my argument. This, however, I allege he has entirely failed to do. But hear him yet a little farther.

He, Dr. Mac Cormac, claims to be the discoverer of the cause of tubercle and, if he be right in his claim, he has made a discovery which will eclipse all the discoveries of Louis. Very good, but what are the actual facts. Louis made no discoveries and laid claim to none. His treatise on phthisis left the malady, its precise nature and origin regarded, exactly where it found it. His very words are these, they speak sufficiently for themselves. The knowledge of causes is without question the most important that any one can propose to himself in medicine. Our investigations have not revealed to us the causes of pulmonary tubercle.* So that in order to give point to a somewhat uncommon rhetorical artifice, and compass a little depreciation as well, the reviewer does not hesitate to award to an inquirer a position which the inquirer himself in the record of his labours, and for the best of reasons, has dis-

* La connaissance des causes est, sans contredit, une des plus importantes qu'on puisse se proposer en médecine. Nos observations ne nous ont pas appris la cause de tubercules pulmonaires. *Recherches Anatomico Pathologiques sur la Phthisie*, p. 521, 2.

claimed. My histogenesis then of tubercle, for anything here or elsewhere alleged in its disproof, I submit, is the true one, first because it reposes on unassailable facts and correct observation, and, secondly, because it is one which it has been found impossible to refute.*

Besides the foregoing, there are, however, other notices, for instance those in Virchows *Archiv*, not less genial than they are candid and appreciative. From these, partly on the score of their intrinsic excellence and fairness, and partly as bearing on the reception of my views in Germany, I shall now venture to cite a portion.

In a work, observes the German critic, reviewing the first edition of my treatise, written with much learning, and which everywhere adheres closely to the immediately practical requirements of therapeutics and prophylaxis, the author aims to show that the proximate causes of consumption and tubercle are to be sought for in a respiratory deficiency which he connects invariably and essentially with the inhalation of a stationary and already breathed atmosphere. The theoretical basis of this proposition might lie open to many objections, whilst the empirical proofs which the author furnishes, deserve the greatest attention.† After going into some farther

* Huxley, *Scientific Aspects of Positivism.*

† In einem mit grossen Gelehrsamkeit geschriebenen Werke das jedoch überall den nächsten praktischen Zweck der Therapie und Prophylaxie verfolgt, sucht der Verfasser zu zeigen dass die nächste Ursache der Schwindsucht und des Tuberkels in einer Mangelhaftigkeit der Respiration zu suchen sei, welche er wiederum wesentlich und constant auf das Einathmen verdorbener eingeschlos-

details, the candid and intelligent reviewer proceeds to refer his readers to the book itself, as one well calculated to rouse energetic reflection. In a second and not less appreciative notice of my treatise in its German dress, the work is again commended to the special consideration of German practitioners. The chapters on etiology and prophylaxis, the writer is pleased to observe, contain the most important observations.* To American Dutch and French expressions of opinion, some of them warmly commendatory, I might additionally refer, but the foregoing must here suffice.†

In a recent address Professor Tyndall states that, when the free organic and he might have added inorganic particles floating in the atmosphere are filtered out of it by the lungs or dissipated by incandescence, the reflection of light from those particles then ceases, and is replaced by darkness.‡ The application, the Professor states, is obvious. Con-

sener und schon vorher zur Respiration verwendeter Luft zurückführt. Die theoretische Begründung dieses Satzes lässt viele Einwände zu, während die empirischen Beweise welche der Verfasser beibringt eine grosse Beachtung verdienen. *Archiv*, § 11.

* Wir haben schon früher auf die anregende Arbeit von Mac Cormac aufmerksam gemacht. Gegenwärtig liegt eine deutsche Übersetzung derselben vor, welche sich streng, man wird vielleicht sagen zu streng, an das Original hält, welche aber der Aufmerksamkeit der deutschen Praktiker bestens empfohlen werden kann, da namentlich die Capitel über Ätiologie und Prophylaxie die wichstigsten Bemerkungen enthalten. Virchow, *Archiv* xv, S. 176.

Mac Cormac, *Ueber die Natur Behandlung und Verhütung der Lungenschwindsucht, beiläufig auch der Scrofeln*, übersetzt von Dr. E. Hoffmann, Erlangen, 1858.

† Mac Cormac, *De Rationelle Verklaring van het Ontstaan en Wezen der Longtering en der Klierziekte*, door L. F. Praeger, 'S Gravenhage 1863.

‡ Dust and Disease, *Nature*, Jan. 1870. *Frasers Mag.*, March 1870.

tagion may be warded off by cotton wool respirators, the noxious atmosphere in the dwellings of the poor restored to practical purity and, so far as germs are concerned, the air of highest Alps conveyed into the invalids chamber. Dr. Tyndall, although not a physician at least in the English sense of the term, when he announces the prospect by means of cotton wool respirators of abating irritation and arresting decay, becomes certainly more or less amenable to medical criticisms and, however desirable it might prove by the means proposed or otherwise to intercept the floating germs of disease, cotton wool respirators would at best, unless farther coupled with strictest cleanliness isolation and the incessant replacement of the used up because already respired atmosphere, but poorly suffice. Whether through inadvertence or designedly, Professor Tyndall his commentators and *proneurs* alike, have one and all entirely omitted to speak of a source of atmospheric impurity, at once the most incessant perpetually recurrent and disastrous of any, one in truth in which his cotton wool respirators would not prove of any were it the very slightest avail. Such respirators, unhappily, would not strain from air prebreathed the deadly percentage of carbonic acid with which the processes of life in the act of respiration have freighted it, they would not replace the fatally deficient oxygen, would not either abate irritation or arrest decay, and not for an instant therefore, as Professor Tyndall in his address has ventured to assure us, would they suffice to secure

as thus the introduction of the air of highest Alps into the chamber of the invalid.

We cling pertinaceously to ancient prejudices, until, some fine morning, we waken up to find that after all they were but prejudices, whereupon incontinently we cast them off to be taken up by the unthinking multitude and their successors after them. There is hardly an error or a superstition which has not followed this course. So recently as the fourteenth and fifteenth centuries, if not even later, the evil and reprehensible practice subsisted of administering human remains as remedial appliances. In fact, as such, they found a not infrequent place in the prescriptions of medical men. This truly disgusting procedure of course has long been superseded, and yet to this day the ignorant and deluded many profanely and ignorantly believe that it remains in force. In the medical digest, for example, of the once celebrated Fernelius or Fernel, the edition of which now lying before me runs actually into the middle of the seventeenth century, mummy is prescribed in one place as an astringent, while in another human fat is recommended as an anodyne.* Nevertheless, Fernelius was a noted man in his day, court physician indeed to Henry the Second of France, and, in the very treatise in question, he makes the memorable admission that the laws of nature and of medicine are at one.† Not even now is the belief,

* *Universa Medicina*, Lug. Bat. 1645, p. 258, 263, Medendi Rationes.

† Naturae legibus esse medicinae leges consentaneas. *Id.* p. 3.

once quite a general one, that consumption is communicable, altogether exploded. It was a convenient superstition in its way, and served to exempt those who held it from the somewhat serious inconvenience of having to think and inquire for themselves. The doctor in those days indeed, on being asked to state the cause of consumption, had but to reply that it was a case of infection,* just as the practitioner in these, when pressed with a like inquiry, has only to allege that the influence at work is one purely hereditary, or as the incomparable Argan might have put it,

Quia est in eo
Vitium tuberculosum,
Cujus est natura
Phthisin elaborare.†

Yes, nature and her laws are everywhere and always the same and yet it has been often stated, and pertinaceously repeated in assumed disparagement of my position in regard of the pathology of tubercle, that there are virtually cases, for example those of the Esquimaux and the Icelanders, where natures laws do not in fact prevail, regions where air, the same air, may be again and again with completest impunity respired, and where, this disastrous condition notwithstanding, scrofula and consumption are all unknown. Far off fields it is

* Munk, Krankheiten der Respirationsorgane. *Jahresbericht über die Leistungen und Fortschritte in der Gesammten Medicin*, Berlin 1870, S. 107.

† Molière, *Malade Imaginaire*, Troisième Intermède.

said are green. With too many indeed the unknown is always possible. Only place the scene of action remote enough in time or space, and there is hardly an extravagance which does not then become tenable. We smile complacently when the old chronicler tells us that men there were who walked with heads beneath their arms, and yet this ancient legend is not more baseless extravagant and absurd than the credence which goes to affirm that anywhere there are human beings, to say nothing of the inferior animals, the superinduction of phthisis and scrofula regarded, who can respire with absolute immunity an atmosphere already breathed and wanting in oxygen. We should brand as impostors or lunatics those who would now maintain the one, and yet have not a word of reproach for the hardy assertors of the other. On the principle, I suppose, of *omne ignotum pro possibili*, it has been repeated, every reasonable showing and presumption to the contrary notwithstanding, that there was no consumption nor, in fine, any form of scrofula or tubercle whatever, either in Iceland or in the Esquimaux country. But what are the actual facts. I have it under the hand of Mr. Simpson who as surgeon to the Plover exploring ship passed four years in the regions in question, and to whom I applied for information, that among the Western Esquimaux individuals of unquestionably scrofulous habit, in whom the glands had suppurated leaving indolent sores behind, were occasionally met with. And no doubt, he adds, had the settlements been more extensively visited in

the winter season more disease of this nature would have been detected. Several instances of phthisis, indeed, came under observation, and one was watched attentively which ran a rapid course. A girl of fourteen or fifteen who appeared in the bloom of health in September, was cut off early in the winter following after displaying all the symptoms of galloping consumption.

With regard to Iceland also, the evidence is equally peremptory. In or about the year 1847, Dr. Schleisner received the King of Denmarks mandate to proceed on a medical mission to Iceland and the Westmann Islands, there to investigate the reason of the destructive prevalence of *Ginklofi* or *Mundklemme*, the trismus of the newborn or *Smaabörn*, as Schleisner names them, in Heimacy in particular, as well as to inquire into the sanitary condition of Iceland and the islands generally, and afterwards report on the same to the Sundhedscollegium or College of Health. The resultant volume or report in the Norse or Danish tongue, which I was at pains to procure from Copenhagen and lies now before me, appeared in the year but one following.* At page three of the Report in question and in the very first paragraph, Schleisner mentions having encountered scrofulous and otherwise tuberculous children, *kiertelsvage Börn*, even in Reykjavic families, and of course under the very eyes of the local medical practitioner Dr. Hjaltelin himself. And yet this volume

* *Island Undersögt fra et Laegevidenskabeligt Synspunkt*, Kjobenhavn 1849.

of Dr. Schleisner, has been actually cited by an anonymous writer in the *Westminster Review*, as countenancing his equally incorrect and improper statement that tubercular disease in Iceland was wholly absent.* In the course of his next ensuing paragraph Schleisner adverts to so many as nine instances of ordinary phthisis, eight of hemoptysis, and five of vomica of the lung, *vomica pulmonis*, or some twenty two instances of tubercular disease in all. At page thirteen, he specifies nine cases of purulent and bloody sputa, *Blod med purulent Opspytning*. At first, indeed, he says he should have considered these as purely phthisical but, afterwards, he was not so absolutely reliant on his diagnosis, so frequently is embryo tapeworm associated with tubercle in Iceland. The presence of cysticerci along with tubercle, however, I need hardly observe, does not render tubercle any less tubercle than when it subsists without them. Unhappily, cysticerci or embryo tapeworm are so prevalent in Icelandic lungs, that their coexistence with pulmonary tubercle might perhaps be generally assumed. At page twenty six, Schleisner gives lists of chronic lung and heart disease, *chroniske Lunge og Hjertesygdomme*, phthisis hemoptysis and vomica inclusive. Again, at page thirty, he adverts to a series of full three hundred and twenty seven cases which he examined and treated himself, *som jeg har undersögt og behandlet pa Island*, three of which consisted of phthisis, *phthisis tuberculosa* as he terms it, and ten of strumous

* October, 1856.

scrofulous affections, otherwise thirteen instances of tubercle in all. At page thirty six, there is a table of deaths, from 1827 to 1837 inclusive, drawn up by the Icelandic clergy, *Praesterne*, all of them educated and intelligent men, which I give for what it is worth. This table, then, ascribes so many as fifteen hundred and fortyfour deaths to chronic thoracic tubercular disease, *Brystsyge og taerende Syge*, to cite the very language of the narrative, itself. Afterwards, Schleisner proceeds to comment on the remedies which are employed in Iceland for the treatment of hydrocephalus, as well as on the prevalence generally of this highly destructive tubercular malady, numerous cases of which, *flere Tilfaelde*, he observes, were not wanting. The final summing up of Schleisners momentous and instructive *Report*, is to the effect that ten percentum of the entire Icelandic population, of course not including masked and undetected cases, a mortality even exceeding the deaths at the bloody assault of Badajos, perish of consumptive tubercular disease, more or less associated with cysticerci. *Af Brystsyge og taerende Syge, hvoraf imidlertid vistnok de Fleste have vaeret bortrevne af Hydatidesygdommen, döer der paa Island* 10,3 *percentum*, are Schleisners words, and those who esteem them inconclusive must be hard indeed to convince. Thus, then, the inhabitants of Iceland are simply decimated by consumption, a most deplorable condition of things, but also one which, however inconvenient the reality may prove to those who in the very face of facts assure us nothing the less of the

perfect immunity of this island from tubercle, is strictly conformable to the logic of facts, while it illustrates the consequences inevitably and necessarily ensuing from the habitual violation of the laws of the living economy in itself, as well as those which govern its relations in regard of the material universe around. How could it indeed be otherwise. Icelandic houses are miserable in the extreme, while the sleeping-places, in which as Schleisner tells us entire families are constrained to seek shelter and repose, *Opholds og Sovevaerelse*, are on a par with the houses. Vermin the most repulsive everywhere swarm, direst stenches pervade the dark and dirty dwellings. The single fire, maintained by fuel composed of dried weeds sheeps droppings willow root peat and *Surtur-brand*, a sort of lignite, hardly suffices to warm or ventilate. Small openings to be sure there are in roof and wall, the latter occasionally glazed or covered over with the amnion of the sheep, which perchance admit a little air but, in the matter of ventilation, Mr. Shepherd assures me, he found little to choose between Germany Denmark and Iceland itself. Thus harassed, phthisis struma scorbutus leprosy and tapeworm, to say nothing of the exigent climate, all combining their terrible inflictions, one only wonders how the population scanty as it is, amid such real hardship and flagrant violation of organic law, find it possible to exist.* Doubtless the extant mortality

* *Iceland*, Henderson, *passim*. Sabine Baring Gould p. 60. Paijkull, *En Sommer pä Island, passim*, English tr. p. 91. Gaimard, *Voyage en Iceland*.

would prove even greater than it is, were it not for the necessity under which the people lie of being much, early and late, out of doors providing for their cattle and looking after the produce, when there is any, of their little fields or *tuns*.

In a series of letters addressed to the medical journals,* based on a written communication purporting to come from Dr. Hjaltelin of Reykjavik that in thirty thousand cases, for such is the singular averment, the latter failed to discover a single instance of tubercle, Dr. Leared requires us to believe, the personal habits and mode of living and Dr. Schleisners explicit testimony to the contrary notwithstanding, that there is not any consumptive scrofulous tuberculous disease in Iceland whatever. Like causes, however, lead everywhere to like results. A law of nature, the facts being otherwise the same, cannot subsist in one place and not subsist in another. For truth is true everywhere, alike at all times and in all places. When Dr. Leared is able to point out any region where the square of the hypothenuse is not equal to the sum of the squares of the other sides then, but not till then, shall I lend credit to his conclusion that tubercle, under existing conditions, is absent from Iceland. Natures laws in Iceland are not different from her laws elsewhere, nor are the penalties attached to their infraction different. It is not very desirable I submit, to stand in opposition to nature and to fact. Dr. Hjaltelin does not inform us of what his thirty thousand cases consisted, where

* *Brit. Med. Journ., Med. Times and Gaz.*

they occurred, or by whom the needful particulars are recorded. No postmortem or other collateral details are adduced, neither is Schleisners evidence nor the experience of any contemporary practitioner, the perfectly unsupported and inconclusive statement of Dr. Skaptason Dr. Hjaltelins son in law excepted, ever adverted to. Explanations of any sort are not once vouchsafed, nor is it shown how amid a sparse and scattered community of some sixty or seventy thousand souls all told, cut off from intercommunication by natural obstacles during great part of the year along a coast line of a thousand miles or more, in an island larger than Ireland, and in a little village capital of a couple streets,* it was possible to witness much more determine such multitudinous particulars, in a word to verify on so prodigious a scale the asserted absence of tubercular consumptive disease in opposition to every principle of established physiological and pathological law. Not once, not even once in all these thousands of cases, we are told, was any tubercle to be found. It proves almost a little too much even for Dr. Leareds purposes. It would at least be a satisfaction to know who Dr. Hjaltelin deputed to obtain the needful particulars, or did he, all gifted with ubiquity, determine them over the island for himself. Else who on earth was to sift the details of thirty thousand cases, to conduct the needful postmortem inquiries which, at the rate of three daily, would occupy a period of some thirty years. Even with the comparative facilities of

* Henderson, *Iceland*, 2d. ed. p. 43.

France England and Germany combined, such an exploit, one which puts the records of our Morgagnis and Hunters to shame, would be difficult to compass, but in Iceland, and for a single practitioner, what must it then have been. But it is needless to deal further with a statement so extravagant. There is no evidence of such inquiries, were they even practicable, having at any time been made. The entire statement is at utter variance with recorded, well attested facts, and simply undeserving of serious consideration. *Deridendum est.*

Dr. Hjaltelin does not indeed even stand over his own averments since, on turning to Dr. Dobells current yearly *Report* on the progress of medical science, in which there appears a paper on Icelandic diseases by Dr. Hjaltelin himself, the subject of tuberculosis or tubercle is not so much as once adverted to, although I discover in it my now pretty well disseminated expression of rebreathed air.* As for Dr. Leared, he never attempts to reason out the question but, with the drollest indifference to the rules of evidence, not only casts aside the well established testimony of Schleisner, but further pins his faith on a private and wholly unsustained averment, one which, dispassionately weighed, it is simply impossible to entertain. Iceland, having now become a freeport, will doubtless materially improve, and as for the conjoint plagues of tubercle and tapeworm which so beset its interesting inhabitants, they may, by strict sanitary observances, conjoined with the respiration of air not

* London, Longmans 1871.

previously breathed, and well cooked food for man and dog, escape the liability to both when they will.

No one, it has been said, is so blind as he who refuses to see, none so deaf as he who will not hear. When Dr. Hjaltelin and Dr. Skaptason penned their astonishing manifestoes touching the alleged immunity of Iceland from tubercular consumptive disease, they forgot or, at any rate, ignored the existence of Schleisners evidence so entirely fatal to their asseverations. They appear, however, to have found a willing listener in Sir Thomas Watson. This statement, observes Sir Thomas, to wit Icelands alleged exemption from tubercular consumptive disease, called in question, has very recently been confirmed by unimpeachable testimony zealously collected and made public by Dr. Leared.* Sir Thomas afterwards proceeds to tell us how Dr. Hjaltelin, a distinguished physician of Reykjavic, declares that during fifteen years he had had more than thirty thousand patients and made numerous autopsies without once witnessing tubercle or indigenous consumption, while Dr. Skaptason the oldest and most experienced physician in Iceland, during thirty-two years practice never encountered *phthisis tuberculosa* or, in his autopsies, observed the least trace of tubercle. The only comment which I shall here permit myself to pass on the above is, I fear, the somewhat ironical one of how remarkable must prove the industry which under such unpropitious circumstances, could collect the particulars of so many

* *Lectures on the Principles and Practice of Physic*, Vol. I, p. 227.

thousand cases, and how singular the fatality which should condemn both father and son in law never to meet, even a single instance of a malady which not only ravages the rest of Europe, but which, unless we reject the unassailed and unassailable testimony of Schleisner, decimates the inhabitants of Iceland as well. Sir Thomas Watson then goes on farther to repeat from the *Westminster Review* that all the usually so considered causes of consumption and scrofula, such as imperfect ventilation scanty food unchanged attire cold and damp, subsist in Iceland, and yet that consumption and scrofula are there unknown. This double misstatement I exposed in my treatise on Consumption,* while I forwarded a reclamation which was refused insertion to the journal in question. Schleisner indeed maintains the exact opposite to what the very unreliable reviewer and Sir Thomas Watson, thus misled, ascribe to him. Either then the writer in the *Westminster*, having never read Schleisners book has asserted of it what he did not and could not know to be true or, having actually perused the work, has nevertheless misstated facts. Thus, this soidisant reviewer, referring to Schleisner as his authority, affirms that neither scrofula nor consumption subsists in Iceland, whereas the Danish Medical Commissioner not only declares that these maladies do there subsist, but that one tenth of the entire Icelandic population is carried off by them. Had Sir Thomas Watson but consulted the pages of Schleisner for himself, or even cast an eye over my

* *On Consumption*, page 174.

faithful transcript from them, he would perhaps have hesitated ere he committed himself to statements which cannot enhance the merits of his otherwise important work or in any wise detract from the validity of the conclusions in mine.

But further, on the fifth day of this current January 1872, I called on Sir Henry Holland and asked him to favour me with some particulars as to his experience of phthisis in Iceland. He at once referred me to Mackenzies *Travels*, the *Appendix* to which on the Diseases of Iceland he likewise informed me that he had furnished. In this appendix Sir Henry expressly adverts to the great tendency of the Icelanders to pulmonary complaints. He also dwells on the circumstance, trivial in itself but otherwise of moment as bearing on the prevalence of phthisis in Iceland, of the *lichen Islandicus* being much resorted to by the natives in the treatment of lung affections, phthisis pulmonalis in particular. Sir Henry Hollands first voyage to Iceland took place sixty years ago, but he made a second one during the autumn only four months since. When last at Reykjavik, he told me, he was requested in his professional capacity to visit two persons. Upon inquiry he found that they were patients of Dr. Hjaltelin, and of course declined to see them until he had communicated with the Doctor. Dr. Hjaltelin however expressed a wish that he should visit them, which Sir Henry did accordingly, and found them both labouring under phthisis. No one, I suppose, will venture to call in question the

validity of Sir Henry Hollands testimony which of itself would be more than adequate to establish the fact of the existence and prevalence of tubercular disease in Iceland.

It is only in truth by coming into daily actual contact with them, the community being deadened to the dread reality, that we arrive at any even approximate conception of the frightfully prevalent ravages of consumptive tubercular disease.* Few practitioners, observes Mr. Tait, are aware what a fearfully common thing is tubercular disease, and how many cases we miss for one that we discover.† The evil consequences accruing from overcrowding in city country and town, the habitual persistent violation of every vital law, must be witnessed to be believed. Under such circumstances desolation and disease and death have it all their own way.‡ And I cannot so much as imagine any material abatement in the ravages of tubercle short of permanently effective alterations in the construction of human dwellings and the habits of the occupants.§ There is not unhappily a bodily structure which tubercle does not implicate, a function which

* Die Phthisis ist eine äusserst häufige Krankheit derart, dass nach V. Niemeyer etwa ein Siebentel bis ein Fünftel aller Todesfälle durch die Lungenschwindsucht bedingt sind, und dass fast in der Hälfte aller Leichen—die Residuen derselben in der Lunge gefunden werden. Oppolzer, *Vorlesungen über specielle Pathologie und Therapie*, von Von Stofella, B I, S. 639.

† Myoidema of Phthisis, *Dublin Quarterly Journal of Medical Science*, Nov. 1871.

‡ Mr. Parnell, *Daily News*, 1 Jan. 1872.

§ Mac Cormac, *Moral Sanitary Economy, Plan for the Relief of the Poor, Plea on behalf of the Poor.*

primarily or secondarily in its sequences it does not invade and derange. No tongue could narrate, no pen indeed declare its deplorably frightful ravages. The exquisitely beautiful fabric of the eye does not escape,* much less with all their admirable mutual adjustments, the muscles joints and bones.† The entire living material fabric, this so magnificent handiwork of God, is in truth disintegrated defaced and destroyed. The interior and exterior tissues waste and wither,‡ the fingers become misshapen, the nails curve over, the muscles both of organic life and the life of relation, M. Paul observes,§ no longer adequately nourished lose their volume, the lung tissue, as Rokitansky tells us, ulcerates and disappears.|| Virchow has even seen the trachea penetrated at its bifurcation by an ulcer extending into the adjoining bronchial gland. The breath is as if from a vault and, in laryngophthisis, as the observer last named terms laryngeal phthisis, the poor sufferer, spitting choking coughing, is perhaps carried off by suffocative spasm of the glottis at last.¶

* Vernon, Tubercle in the Eye, *St. Bart. Hosp. Rep.* 1871.

† Haward, Chronic Bone and Joint Disease. *St. George Hosp. Rep.* V. IV.

‡ Das algemeine Bild der Zerstörung der Lungen. August Foerster, *Handbuch der Allgemeinen Pathologischen Anatomie.* Zweite Auflage, S. 232. Rindfleisch, *Pathologischen Anatomie,* Art. Tuberkel.

§ *Gazette des Hopitaux,* 16 Nov. 1871.

|| Durch ulceröse Destruction des erkränkten Organes im Processe der tuberculösen Phthisie. *Lehrbuch,* S. 308.

¶ Versuchen die Kranken zu sprechen, so wird die Inspiration gedehnt, pfeifend, keuchend, und selbst suffocatorische Glottiskrämpfe können sich hinzugesellen. *Handbuch der Speciellen Pathologie und Therapie,* bearbeitet von M. A. Wintrich, B. V, S. 463.

Tubercle with its direful inflictions is not however confined, as certain hypotheses as to its origin were they true would confine it, to the indigent, the needy and the poor, since its accursed ravages extend hardly less severely or less urgently to the rich and well to do, at least in so far as they are found to neglect and omit to breathe that pure untainted atmospheric oxygen without whose habitual respiration there can be no firm health, no abiding stamina, and, above all, no secure immunity from the incursions of scrofulous tuberculous disease. Indeed, the atmosphere of almost the vilest slum, if only freely admitted into the meanest sleeping chamber, would render that chamber, quoad the air supply of its occupants, preferable to the palace from which the unbreathed outer atmosphere was excluded by night.

Mrs. M. was or rather had been a robust and vigorous person of some sixty years of age. She was in the enjoyment of every reasonable comfort, slept in a high fourpost curtained bed, never went out into the open air when she could avoid it, and took the utmost care that as little of it as possible should reach her at any time. She had suffered long from the bronchitis induced by tubercle, and the amount of pus tubercle mucus and the like matters, which she expectorated daily, was something prodigious. Her daughter having become unwell, Mrs. M. with a view to nurse her the better, yielded up her own bed and lay on a shakedown on the floor. The result was a violent attack of pneu-

monia, under which Mrs. M. sank after a few days suffering. Having obtained permission, I examined the remains. The right lung was hepatised throughout its entire lower third, but, besides, both lungs were simply crammed with tubercles, some of them quite as large as walnuts. There were cavities likewise, some of them of considerable dimensions. Pneumonia apart, the amount of disease was enormous. But nature appears to adapt herself to conditions which, were they only of sudden infliction, would of very necessity at once terminate existence. The cases of two maiden sisters, nevertheless, were if possible yet more strikingly illustrative of the production of tubercle from the habitual respiration of air prebreathed than was even that of Mrs. M. herself. These sisters, likewise, were in easy circumstances, in fact possessed of all the material goods of life and, yet, nothing the less did they suffer themselves to be destroyed. The older sister, as might be expected, perished first. She lived almost entirely in her chamber and, irrespective of listed doors and windows where every chink and crevice were uniformly pasted over, the curtains of her fourpost bed were carefully drawn and pinned to, every night and all night long, besides. It would be impossible even to conceive lungs more miserably invaded than were hers. Wherever tubercle could lodge, there in fact was it to be found. Little indeed of the original pulmonary tissue was left intact. How life could so long subsist, subjected to such a pressure, it was

difficult even to imagine. To repeat the particulars of the other sisters case, and recount its disastrous issue would be merely to recapitulate what has been already stated.

But how many such instances might I not adduce. A practitioner, now deceased, who resided in a maritime village, the resort of health seekers, requested me to visit one of his young people who was unwell. Going into the sick chamber I found four curtained beds, the sleepingplaces of as many sisters, with doors and windows which by night I found were never opened. Now, each of these young persons died in succession of phthisis. I had their cases under observation. I saw them severally perish. Two others of this tubercle stricken family a brother and a sister there were, who occupied separate chambers, and lived comparatively out of doors. Well, these two, I mark the circumstance with emphasis, did not incur the tuberculous scourge. But I also knew six brothers of one family and six sisters of another, besides five, four, and three of other several families, who perished thus and thus of phthisis. If such instances, which were peoples intelligence only not dulled and stupified by their excessive frequency ought to strike absolute terror into a community, if they do not go to establish my position absolutely that rebreathed air, and rebreathed air only, induces tubercular consumptive disease, then in truth are cases and reasonings founded on them, in regard of this or indeed any other subject, simply thrown away.

John Hunter used to say that the development of puberty tends to put a stop to the assaults of scrofulous tuberculous disease. But those who have gone thus far with me in the conduct of my argument must I think concur, that the mere advent of the period in question is not alone calculated to bring the ravages of scrofula to a term. The new incentives to action which puberty to be sure induces, with the increased amount of life and energy which is apt to attend it, will of course, if not too much counteracted by disease, prove beneficial. And yet they do not always yield relief. With how many instances in truth of tubercle, in the guise of scrofula or of scrofula and tubercular phthisis combined, have I had to deal after the supervention of the period in question. Nor am I single in my experience. Every medical man might relate, some more some less, a similar tale. It is in fact impossible to deal effectively with phthisis or with the terrible and revolting scourge which we term scrofula, unless by abating those destructive influences which, I allege, are alone productive of the malady. It is hard to imagine that any one, even the inquirers who originate them, should be content to remain satisfied with such expressions as hyperplasms sarcophytes bioplasts phthisoplasms, and the like, as illustrating the true nature and indoles of scrofulous tubercular disease.* However difficult may prove the removal of the misconstructions and prejudices which yet oppose the reception

* Williams, *Pulmonary Consumption*, p. 67.

and practical recognition of the views which I have advanced so entirely in accordance with the dictates of sound deduction and natural law, I have nevertheless the satisfaction of thinking that they must be relegated one day to that limbo of nonentity which is the fitting and inevitable resting-place of every hurtful prejudice and vile delusion.

An instance of the extreme lengths to which absurdity can run on the subject of the production of tubercle, is the assertion that phthisis and scrofula, quoad their extension and prevalence, bear an exact proportion to the practice of vaccination.* This extravagance, however, is exceeded by Hérard and Cornil who will have it that phthisis may be propagated even as the species itself is propagated.† And, yet, these statements are not a whit more unfounded or preposterous than those which go to affirm that there are countries and people in which, the habitual respiration of a prebreathed atmosphere notwithstanding, tubercle and the maladies which spring from tubercle are alike unknown. Beaten, bit by bit, from their imagined strongholds in these regions, my disconcerted and baffled opponents are now fain to find refuge in some misty Iceland or far off Esquimaux shore. Vain hope, the conditions which affect life and bear upon the induction of disease in whatever concerns the race of man, do not quoad essentials differ in Labrador from those

* Evidence of Dr. Pierce, *Cooperator and Antivaccinator*, No. 296.

† Enfin dans quelques cas ne pourrait il pas arriver qu'un phthisique atteint de tuberculisation, inoculât directement à la femme le principe virulent. *La Phthisie Pulmonaire*, p. 564.

that subsist on our own shores. Whatever leads to tubercle in the one will as surely, in exactest proportion to the gravity of the factors, conduct to it in the other also.* There is in truth but one single cause of tubercle, but then it is the cause in especial, the *causa sine qua non*. It is the condition of the atmosphere as already breathed, it is in fact the breath rebreathed and no other. The retrograde carbon, no longer adequately oxidised and eliminated, accumulates perforce within the living breathing organism, impedes and finally extinguishes its healthy workings.

Dr. Allbutt tells us he cannot doubt that in many cases of phthisis we have no such thing as tubercle, in the strict sense of the term, in other words that we may have *phthisis sine tuberculo*.† This indeed would be like the play of Hamlet with the part of the renowned prince left out. The teachings of Laennec and his followers, Dr. Allbutt lets us know as if it were matter for self gratulation, never had a firm hold on his mind. There is nothing, however, in the writings of Niemeyer, Waldenburg, Villemin, Burdon Saunderson and others whose names he cites apropos of no conclusions in particular, which sets aside those imperishable lessons. There is further, I affirm and maintain, no such thing as caseous tubercular

* Meiner Ansicht nach, Lungentuberculose herrscht in Gegenden mit einer gedrängt lebenden Bevölkerung. Hirsch, *Handbuch der Hist. Geograph. Pathologie*, B. II, S. 102.

Die Quelle nicht in den elementaren, sondern in den gesellschaftlichen Verhältnissen gesucht werden muss. *Id.*

† *Medical Times and Gazette*, 18 Nov. 1871.

pneumonia, and what Dr. Allbutt so terms, whatever may be its minor conditions, is in effect no other than tubercle of the lung. Subsequently Dr. Allbutt proceeds to speak of phthisis as a neurosis, but of what nerve or nerves he does not precisely specify. He says indeed the more he studies the disease, the more he is satisfied that the lung mischief is a neurosis originating not in the local but in the nervous tissues, probably the nervous centres, the apices of the lungs in certain persons taking on a somewhat sudden consolidation under the influence of nervous causes. If we turn to the diseases found in their relatives, whose relatives is not however apparent, we find, Dr. Allbutt avers, a marked tendency to neurotic forms, chorea, stammering, epilepsy, neuralgia, and insanity. But phthisis is utterly remote from nervous maladies, not for a moment is it allied to such. And as for lunacy, it is associated with tubercular disease only when the subjects of lunacy respire an atmosphere already breathed, scant in oxygen and charged with respiratory feculence. Ordinary acute pneumonia of the lung apices, Dr. Allbutt has no doubt is an occurrence of the same kind as his special form of phthisis. But then there is no such thing as acute tubercular pneumonia of the lung apices, whether ordinary or extraordinary, and therefore it cannot be correct to characterise consumption as such. Further, phthisis does not begin with sudden consolidation in a night, nor is it identical with pneumonia, much more pneumonia with it. Dr Allbutt winds up with commending

the exhibition of arsenic in what he calls neurotic phthisis. But phthisis is not a neurosis, nor is arsenic the appropriate remedy. If he will only permit, I would urge Professor Allbutt strenuously to fall back on Laennec for the morbid anatomy and prognosis, and to rely on me for the pathology and therapeutics of phthisis. When he informs us, however, that this infamous scourge is rife in Leeds, he adds one more valuable testimony to its frightful prevalence there and everywhere.

Evade or cushion a new truth as much as we will, its vitality if not our own is indestructible, and sooner or later it is certain to prevail. Forty long years, it seems almost incredible, after the publication of Newtons discoveries, the doctrine of vortices held by the illustrious but in this instance quite mistaken Descartes continued to be instilled from the chairs of Cambridge until tardily and through the efforts of a single man of science the university was shamed into its rejection. Phlogiston had a long reign of it, and died hard. Every delusion indeed dies hard, and even yet many and many a destructive one swathed in purple and fine linen sits throned in high places, the patient genius of humanity waiting the good time coming to cast it down from its evil eminence never to rise again. Did the scandalous and reprehensible apathy however above adverted to detract from or in any wise impair the validity of Newtons views. Assuredly it did not, and it is tolerably certain that another forty years will hardly elapse ere the wholly fortuitous circumstance of a

grandparent happening to labour under phthisis shall cease to be esteemed the cause of tubercle in a descendant. In fact, the supposition is quite gratuitous, a perfect *Deus ex machina* to save the toil of thought. We do not incur tubercular consumption, no not though fifty grandparents, with every intervening relative besides, were to perish of it, unless through our laches and remissness, otherwise, we render ourselves subject to the malady.

We may substitute, if we please, one species of sustenance for another, and the choice offered to us in this respect is very great, but there is no possible option in regard of an unpolluted unprebreathed atmosphere. This we must have or die. The suitable expansion of chest and lung, in truth the proper exercise of the entire breathing apparatus direct and auxiliary, is the very *point de mire* at which we are continually to aim, and the more we fall short of it, the greater also must prove our immediate loss and final irreparable discomfiture. It is simply impossible to ignore the great conditions imposed on us by nature and safely live. The low ceilinged hermetically sealed apartments which we too often occupy by day, together with the stagnant ill ventilated chambers, in which we repose by night, cool the ascending breath and return it, or more or less of it, all impure and fouled, to be again and again inhaled by the inmates. The respiration of such breath or any portion of it, the almost utter absence of cornice and ceiling ventilation and closed window screen of adamantine glass, conduces at

once directly and indirectly, to the formation of tubercle and the premature hopeless decay of our complicated yet exquisitely adjusted organism. The losses entailed by war, the deadly assaults of ravening epidemic disease, great as they seem, great as they really are, yet count as nothing almost when contrasted with the terrible and yet quite needlessly incurred devastation entailed by scrofulous tubercular disease.

Malodours and malaria infest alike the private dwelling and place of public resort, for everywhere subsists the accursed plague of air prebreathed and foul. Le Blanc determined the presence of fifteen parts carbonic acid per ten thousand of air in the theatres of Paris. Loppens found from twenty-three to fiftyeight in those of Ghent, while Angus Smith, Roscoe and others detected from thirty to forty in similar localities in London. The results of the researches of Stiles, in respect of the extant atmospheric defilement in places of public resort in New York, are entirely congruous with those just stated, as with the general conclusions arrived at by Guy, Lombard, Baly, Pettenkofer and myself.* Pettenkofer, indeed, goes so far as to affirm, and I agree with him quite, that when a larger proportion than two parts in a thousand of carbonic acid, the result of respiration coupled with other exhaled matters, *in Folge der Respiration und Perspiration der Menschen*, creates a perceptibly unpleasant odour and sense of oppression on the

* *Scientific American*, April 1870.

chest.* In an apparatus specially devised by him, M. Galibert ascertained that about seventy litres of atmospheric air were thoroughly vitiated by the act of respiration in about ten minutes.† The atmosphere in French schools and hospitals, indeed, is often detestably bad, and the display of scrofulous tuberculous disease excessively great. Open windows by night are things unheard of and unknown, and machine ventilation, even at the Lareboisière, does not sufficiently well replace them. Health, nay life itself, is only compassable such and such vital postulates being complied with, and not otherwise. Without adequate ventilation we cannot possibly get rid of the ten or twelve hundred cubic inches of carbonic acid gas which the lungs, under pain of eventual forfeiture and death, are bound more or less to eliminate hourly. No air, at least no respired air, ought to contain a larger amount of carbonic acid than the infinitesimally minute proportion of from one to two parts per ten thousand supplied in the otherwise untainted and, oxygen regarded, sufficing general atmosphere. For then and then only it is that the effete carbon of degradation, being duly oxidised and converted into carbonic acid, is excreted in the very act of respiration, rendering its deposit, in the dead yet infinitely destructive form which we term tubercle, impossible.‡

* Sobald die Luft mehr als zwei tausendtheile Kohlensäure enthielt, wurde schon sehr deutlich ein unangenehmer Geruch und ein lästiges Befinden wahrgenommen. Cited in my treatise, *Consumption as Engendered by Rebreathed Air*, p. 235.

† *Revue des Deux Mondes*, Jan. 1870.

‡ Schöffer, *Zeitschrift für Rat. Med.* Band XI, § 89.

In truth, the indoor air of human dwellings, as far as is practicable, should prove the perfect counterpart in respect of purity and unprebreathedness of the air without, else the evil results accruing from the habitual respiration of an atmosphere breath tainted and deficient in oxygen, are in no wise to be avoided. Everywhere, almost, the incessant violation of respiratory law, coupled with the brute deterioration of that so indispensable fluid which the Almighty has lent us in such unpolluted opulence, is productive of multiplied suffering and premature decay. Disguise or evade the conclusion as we may, the carbonaceous feculence of respiration cannot lodge within the tissues of the living organism without the urgent everpressing imminence of disease and death. Picked men, herded together in crowded barrack rooms, marines forced by reason of crass ignorance and doltish routine to occupy the airless lower, instead of the relatively airy upper between decks of ships of war, have been handed over mercilessly to the ever ravening inflictions of tubercle and death. Dentists assistants, owing to the frightful workroom atmosphere which they are habitually constrained to breathe, are phthisical almost to a man. Attorney's clerks and other clerks, house artisans, servingmen and servingwomen, binders of books, typesetters, needlemen and needlewomen, bakers, druggists, men of books and of the pen, victimised if not by utter unacquaintance with, at any rate by an almost general disregard of imperative organic functional needs, are decimated

similarly. We may close our eyes lest we should too plainly see the else only too obvious inference, purse our lips so that we may not falter out some half assent, but, believe it or not, this abominably destructive malady may be erased from the long register of human suffering when we will. Tubercle and tubercle induced disease are at this moment the immense material scourge and desolation of the world, and yet by simplest compliance with natures requirements, the plain clear dictates of respiratory law, daily hourly and at all times, this deadly and desolating infliction, I affirm maintain and declare, might not only be abated, but its absolute final extinction might also be for ever assured.

CARBONAEMIA THE IMMEDIATE SOURCE OF TUBERCLE.

British Medical Association, Dublin, August 1867.

When pus accumulates abnormally in the blood, we have the condition named pyaemia. And when urea does so, we term it uraemia. Now, the effete unoxidised carbon, I contend and assume to establish, gathers in the blood similarly and, when it does so, justifies a like distinctive appellation. I would commend, therefore, to the acceptance of physiologists and inquirers generally, in short to every one interested in a real as opposed to a suppositious and in fact unreal pathology, the expression carbonaemia as significant of a condition of things equally certain and not less demonstrable than are any of the morbid states suggested by the expressions pyaemia and uraemia themselves. As the kidneys are the great if not exclusive emunctories of effete and dead azote, so are the lungs emunctories likewise of the equally defunct and effete carbon eliminated during the effective performance of the healthy

processes of respiration. The atoms constituting the living breathing organism undergo change ceaselessly, one series replacing another series as one vital act succeeds another vital act, while life endures. Than this interchange nothing, I submit, can be imagined more wonderworking or marvellous. The everflowing vital current which disintegrates and undoes portion by portion the entire organism, just as incessantly reconstructs and builds it up again. The dead and effete azote hydrogen oxygen phosphorus sulphur lime and iron, whatever be their guise or modes of combination, are thrust with all convenient speed beyond the precincts of the warm and breathing organism, where they are no longer needed, and where their further presence only proves productive of disaster and decay. As for the dead carbon it is not only removed, shovelled out so to speak, but, by a most subtle and thoughtful expedient rendered subservient to the efficient maintenance of animal warmth throughout the entire economy, in the very act. The difference indeed between the latent heat of oxygen and that of the carbonic acid which it so incessantly displaces, suffices precisely, in warm-blooded animals at least, to raise the blood and the whole organism along with it to the temperature of one hundred degrees or so of Fahrenheits thermometer, without which most refined and providential arrangement, life or being, as now constituted, could not anywhere subsist on earth.*

* Seit Lavoisier diese Entdeckung gemacht hatte, war die Quelle

When abnormal conditions sufficiently long impede the proper elimination of the effete excrementitious azote, the blood then and there is reduced to the condition well known to pathologists under the designation of uraemia, of which death is almost invariably the prompt result. If, however, the accumulation of the effete azote within the circulating medium prove less considerable in amount, the toxic influence itself is proportionably diminished, and we have instead the gouty diathesis, *goutte* or *gutta* of the old humoral pathologists, with perhaps concretions of the urate of ammonia in different articulations as well. Equally distressing with *ischuria renalis*, at least before the patient sinks into coma and insensibility and not less fatal, is pyaemia. Here the pus as, under given circumstances, is also the case with the effete azote and effete carbon, is possibly laid down, now here now there, throughout the organism. As for the retrograde and defunct carbon when, by reason of imperfect insufficient oxidation, it is retained within instead of being expelled beyond the living organism, we have first carbonaemia whereupon the blood, in which the intrusive carbon has no right of lodgment whatever, unable to retain it longer, deposits it in the form of tubercle within the tissues which, eventually, it so to speak disintegrates and destroys. If however the several essential vital processes be only performed with accuracy and despatch, the dead and effete car-

thierischer Wärme kein Geheimniss mehr. Pouillet Muller, *Lehrbuch.* La Chaleur et la Vie, Fernand Papillon, *op. Citat.*

bon like other effete waste, takes itself off by its own peculiar outlets and burthens the economy no more.

Every breath, observes an ancient philosophical writer, when inhaled, sustains life and, when respired, exhilarates the body.* Truly so, but then it must be breath unbreathed before. For breath once breathed, becomes in fact poisonous and irrespirable wholly and, breathed again and again, interferes with and sets at naught natures amazing and all sufficing provisions, and induces inevitably deposit after deposit of effete carbon with such local irritation and general functional derangement and distress, that the proper balance of the functions is interfered with, and the organism itself is destroyed. But tubercle, I shall perhaps be told, is not effete carbon, and effete carbon does not become tubercle. Conceding for an instant that this is so, what in such case becomes of the effete unoxidised carbon, and of what does the dead unoxidised matter termed tubercle really consist. Something cannot well turn into nothing, can it, and from nothing can anything come. If indeed tubercle be other than the dead unoxidised carbon, the resultant unconsumed waste of the living organism where, I would ask, does it originate or from what other possible source can it spring. And if indeed it be not the dead unoxidised carbon, what, I would again inquire, becomes of the latter. It cannot well vanish into thin abstraction. The effete carbon then, as I pronounce, is identical with tubercle, and tubercle is identical with the effete

* *Gulistan*, Musle Huddeen Shaik Sadi, Gladwins tr.

carbon. For tubercle, as we must particularly observe, is a dead not a living product, lifeless and unorganised wholly, once indeed living but now the negation of life, in a word the resultant and the evidence of interstitial disorganisation and death.

The genesis of tubercle, observes Dr. Wilson Fox, apropos of Baron and Jenners inconclusive experiments, though long enveloped in profound obscurity, has nevertheless been constantly and repeatedly the subject of inquiry by some of the most illustrious pathologists of the present century.* Very good and very true, but what have these pathologists after all made of it. Have they dispelled the darkness which surrounds the origin of tubercle, shed light on the profound obscurity, in fine lessened any of the difficulties which hitherto have beset the question. It must be conceded that they have not, nor is there I submit any escape from these difficulties other than that which I here set forth. Again and again have I placed this inevitable alternative before objectors, but never once have they ventured on a reply. It is mighty well for people, some people at least, to say no when I say yes, but those who omit to think out or reason the matter for themselves, those who fail to adduce any valid or rebutting evidence in opposition to mine, have no right logically speaking to reply at all. If then my position can neither be turned nor set aside, I am entitled I conceive to consider my thesis as established, to

* *On the Artificial Production of Tubercle in the Lower Animals*, p. 1.

wit, that tubercle is the result of carbohaemia and, further, that carbohaemia itself is induced by habitually inhaling air at once deficient in oxygen and further charged with the poisonous detritus resulting from prior respiration, and consequently unfitted utterly for the wholesome uses of the living breathing economy.

The term tubercle, *per se*, is in truth one perfectly unmeaning and conventional, and might with quite as much propriety be applied to any other given morbid deposit as to the dead and effete matters which, when heaped up within our thereby impoverished and degraded tissues, bear the name. The effete and excrementitious carbon is the tubercle which invariably presents itself in ordinary pulmonary phthisis, in phthisis of the larynx and mesentery, in scrofula from *scrofa* a swine as if swine alone, poor brutes, proved its peculiar victims. In short, it is the very the exclusive cause of the numerous and frightfully destructive maladies which spring from tubercle. A few, very few, portions of the animal frame excepted, tubercle may be posited in any bone, muscle, nerve structure, joint, viscus or gland.* In short, actually or potentially, it invades the entire or almost entire living organism of brutes and men. Strumous meningitis and peritonitis, white swelling so termed, multiplied affections of bones and joints, are tuberculous and nothing else.

* Schüppel, *Untersuchungen über Lymphdrusen Tuberculose.* Tubingen 1871.

And were they only so returned, the death rates, from tubercle, excessive as those rates now are, would be vastly extended. Speaking not long since with Dr. Trench of Liverpool on this matter, he very forcibly commented on the numbers of children registered as perishing of that and the other malady, convulsions for example who, in fact, died owing to the incursions of tubercle and nothing else. Dr. Liouville indeed contends, that when tubercular meningitis subsists, tubercular lesions extend to the whole area of the cerebrospinal envelops and their contents.* Imagine an infant or an adult perishing, as numbers do, owing to convulsions thus derived. The hurried and anxious practitioner naturally and almost inevitably ascribes the fatal issue to the symptom and not to its cause.

To some, perhaps, the particulars here adverted to, may seem unimportant or the results exaggerated. But, in reality, they are of terrible significance as proving that, appalling as these results may seem and are, they really understate the dread realities of the case. It is only indeed of quite recent date that tubercular meningitis, vulgarly water on the brain, has come to be considered as tuberculous at all,

* Les faits que nous nous proposons de décrire ont pour objet de contribuer a montrer combien est fréquente, pour ne pas dire constante, l'extension des lésions tuberculeuses rencontrées dans les enveloppes et la substance cérébrale aux enveloppes et à la substance medullaire. Ainsi, en nous basant sur un grand nombre d'observations, chez l'adulte et chez l'enfant, nous pensons etablir définitivement la réalité de la méningite cérébrospinale tuberculeuse, comme aussi de l'encéphalomyélite de même nature. Faits de Méningites Cérébrospinales Tuberculeuses, Société de Biologie, *Gazette Médicale de Paris*, 30 Oct. 1869.

and the remark, *mutatis mutandis*, might be extended with equal propriety to certain other affections as well. Even up to this present moment speaking of scrofula, if we except phthisis, certainly the most signally tuberculous of all maladies, there are practitioners in medicine, soidisant pathologists, who deny its connexion and identity with tubercle, altogether, thus excluding the great mortality accruing from scrofulous maladies from that which is admittedly induced by tubercle. And yet, in essence, scrofula and tubercle are not two things but one and the same thing. Joseph Frank in his magnificent *Praxeos*, now lying at my right hand, when treating of phthisis, actually employs the expression scrofula of the lungs, *scrofula pulmonum*. Laennec, no mean authority one might imagine, says expressly that tubercles of the lungs differ in no respect from tubercles which, when seated in the glands, assume the designation of scrofula.* And, the lamented Baly, to whom we are so indebted for illustrations of the terrible influence of prison life in the production of tubercle, mentions that he was unable to distinguish between tubercular affections of the external glands and designated scrofula, and tubercle of the lungs or other inward viscera.† Every example of tubercle does not, to be sure, wear

* Car les tubercules du poumon ne différent en rien de ceux qui placés dans les glandes prennent le nom de scrofules et dont le remollissement est, comme on le sait, suivi très souvent d'une guerison parfaite. *Traité*, Obs. XXVIII, Phthisie Pulmonaire Guérie.

† Cited by Phillips, *On Scrofula*.

the actual outer aspect and semblance of scrofula, but scrofula nothing the less involves the invariable presence of tubercle. In *esse* and in *posse* they are in truth one and the same. And until this momentous question of identity shall be settled, it will be wholly vain to think of getting effectively rid of both.

The real nature of hipjoint disease, psoas abscess, white swelling, Potts malady of the spine, tabes of the mesentery, with scrofulous affections generally, so long a profound secret to the many, are to many unhappily a secret still. Carswels announcement that he had detected tubercle in the blood, attracted little attention at the time until further evidence of the at least occasional occurrence of tubercular emboli was furnished, among others, by Cohn with whom indeed I had a conference on the subject not long before his regretted decease.* Not only does tubercle invade the circulating fluid, but it implicates the vessels themselves, disintegrating their very structure, inducing frightful and too often fatal hemorrhage. This in former days was, and indeed still is termed bursting a bloodvessel, according to our past most vague and unsettled pathology, in conformity with which every morbid outbreak was designated and treated as if it were some distinct and separate disease. And yet tubercle, in itself, is not various or manifold, any more than silver or gold is manifold, but

* Cohn, Ueber das Verhältniss von Carcinose und Tuberculose der Lungen zur Embolie. *Klinik der Embolischen Gefässkrankheiten*, S. 357.

on the contrary one. If only we fail to recognise and distinguish the essential characters of a given morbid condition we are at once arrested at the very threshold of our inquiries and our action. The true pathology of phthisis I have again and again set forth. It is simple indeed, lies in fact in a nutshell, and can, as I believe, in no essential respect be invalidated or set aside. With only ordinary insight and common candour, coupled with some little acquaintance with the merest elements of chemical science, I really see no insuperable difficulty in the way of its adoption by any one. The intelligence that enables us to perceive that tubercular meningitis and tubercular peritonitis are not idiopathic and distinct, as they were once considered, but, in reality, tubercular maladies, might also, one would imagine, permit us to discern the common nature and origin of every variety of scrofulous tubercular diseases.* One and all, and one as much as all, they accrue and accrue only from respiring habitually and persistently air already inhaled and exhaled, an act which, by preventing the proper hematosis and purification of the blood, sooner or later of dread necessity induces the anchorage and dread remora of the metamorphic detritus within that organism whose functions it first deranges, then as fatally obliterates and destroys.

The absorbents which dislodge the matter of tubercle from one locality perchance to permit its

* Fox, Observations on Acute Tubercle, *St. Georges Hosp. Rep.* Vol. IV, p. 67.

redeposit in another may haply prove ancillary to its removal altogether. Sometimes the patients state amends apparently all the symptoms are mitigated, and he believes that he is about to do well. Such oscillations indeed are common enough, but their end is death.* Nevertheless Gluge records the dispersion of tubercle when lodged in the lymphatic glands and subcutaneous cellular tissue,† while, oftener than once, Laennec has registered its disappearance from the lungs themselves.‡ I have myself, at various times, observed the one and, as I believe correctly, inferred the occurrence of the other also. Mr. Mac Cormac, of St. Thomas' Hospital, most justly remarks that the local treatment of scrofulous abscesses is of secondary importance contrasted with the constitutional, as comprising pure air improved food and the exhibition of tonic remedies.§ Tubercle indeed, when the masses do not prove too large, too numerous or inveterate, and when disorganisation, ulceration, caries, purulent deposits and sinuses have not gone too far for retrieval may disappear, wholly or in

* La tise tuberculose in se stessa e generalmente considerata ha un corso continuo, tuttavolta avvengono spesso notevoli oscillazoni. Capobianco, *Elementi di Medicina*, Napoli 1843, Vol. III, p. 179.

† Die Aufsäugung der ganzen Tuberkeln wird haüfig beobachtet aus den Lymphdrüsen der Hautzellgewebes. *Atlas der Pathol. Anat.*, Die Scrofulose und die Tuberculose.

‡ Un assez grand nombre de faits m'ont prouvé que, dans quelques cas, un malade peut guérir après avoir eu dans les poumons des tubercules qui se sont remollis et ont formés une cavité ulcéreuse. *Traité de l'Auscultation Médiate*, 4ième ed. 2ième Partie.

§ Medical and Surgical Practice in the Hospitals of Great Britain. *British Med. Journ.* 23 Dec. 1871.

part, from any place and at any time. But this is a consummation to be hoped for rather than calculated upon, inasmuch as the evil influences which give occasion to the deposit will, if permitted, not only add to its amount but also debar its elimination altogether. The best way, by far, is to prevent its formation and, *a fortiori*, its accumulation at any time. In truth, the modes of living which are found most adverse to the formation of tubercle, are also those best calculated to prevent it wholly. The real and standing difficulty, however, is to effect a sufficiently radical change in peoples habits and convictions. Preach to the winds and expect them to obey. A professional man well acquainted with my views and who apparently had lent them his assent put, or suffered his child to be put to sleep in an airless fireplaceless closet or den, with the door shut and window closed. I knew the closet well, as also its equally murderous counterpart, each of but a few feet cube space. Well, the wretched result was the supervention of tubercle with its inevitably fatal sequel, just as a like tragedy and from the same cause had been previously enacted in a different family, I might almost say before my very eyes, in the corresponding closet of the same dwelling.

Two sisters endowed with every charm and grace of youth, lived together in a country house in the enjoyment of all the material comforts and luxuries that life affords. The younger girl, snugged up to death in a perfectly airless sleeping chamber by her devoted mother, perished of galloping consumption,

so named, in her sixteenth year. The older girl who at first had displayed the rudest health, the family having removed into town, was put to sleep likewise in just such another closet as that which had occasioned the destruction of her perished sister, contracted phthisis in her turn, and died within the year. The mansion which the family at first occupied, had indeed been noted for the phthisical mortality of its inmates, the survivors having as I believe actually abandoned it partly on this account. Returning however after the departure of its recent inmates, one of the ladies was carried off by phthisis, as a sister had already been, for all that I could do to rescue her, poor sufferer. The third and only surviving sister, with a niece whose father had himself been destroyed by phthisis, now began to cough, spit blood and matter and, doubtless, would soon have gone the way of the rest. With some difficulty I induced both of them to alter their habits absolutely, to sleep with chamber door and windows widely open by night, by day to live almost continuously on horseback and otherwise in the open air, enjoining such a regimen and therapeutics, otherwise, as were conformable to the exigencies of the occasion. The upshot was that both, aunt and niece alike, recovered perfectly. Both are married women, nor have the years which have since elapsed witnessed the slightest return of tubercular consumptive disease. The windows of their natal dwelling had never once before been opened by night. Its inmates had never lived out

of doors by day. The deaths from phthisis in the connexion, previously, were incessant and notorious. But since the occurrences which I have described, I have not learned of a single one. To me, at least, the inferences seem inevitable as is the light of day when the sun rises above the diurnal horizon.

An admirable young person, whom I had known from childhood, had I found been put to sleep in a chamber which was a regular *cul de sac*, the window and door being both at one and the same end, and both of them kept habitually closed. On examination, I found one lung almost completely disintegrated while, at the same time, the other was extensively tubercle stricken. What could here be done except to promote euthanasia, and so the poor young helpless innocent creature passed away. Now, her sisters, three in all, and three brothers, who slept in airy chambers with open windows, have never during the years which have since passed by, betrayed the slightest token of tubercular disease. In another mansion, almost within sight of where I write, dwelt six sisters and three brothers. Three of these sisters slept in close airless chambers, and died severally of phthisis for all that I could do to the contrary, while the six others who went about a good deal and slept, all of them I believe, with open windows never evinced the slightest symptom of the malady.

Poor Jane B. grew up, almost under my very eyes, from early childhood to flourishing womanhood, then married, contracted phthisis, and died. The

last time I saw her was shortly before her marriage. She was standing bareheaded, but otherwise attired for the occasion, beside a concert room door, awaiting admission with the throng, the living impersonation of youth and health and unaffected grace. So long as she remained under my professional care she flourished exceedingly, but afterwards our relations altered. Before marriage she never slept with her windows closed, after marriage, confined to the house and engrossed with her baby, she never slept with them open. Before marriage, indeed, the ordinary maladies of childhood excepted, she had never once ailed, after marriage she languished and she perished. The foregoing are among the many pitiful and yet, if rightly considered, instructive experiences to which a medical man, in the course of his career, has to look back.

In certain cases it sometimes happens that the earthsalts of degradation, occasionally deposited with tubercle, shall remain behind when the tuberculous matter itself has otherwise disappeared. Bayle witnessed these calciform concretions or, as some term them, calcifications, about four times in nine hundred cases of phthisis.* The expectoration of such cretaceous masses was however adverted to so far back as the time of Paul of Aegina.† One, the size of a large pea, which had been coughed up by a clockmakers son who very intelligently narrated the occurrence, lay long in one of the recesses

* *Recherches sur la Phthisie.*

† Cited by Young, *On Consumption.*

of my desk. These calculous masses, adverted to by Andral Rokitansky and very many besides, are not confined to human beings, since De la Fond encountered them in the lungs and indeed other organs of cattle as well. Bayle would have it that there was a calculous phthisis but, without going this length, the presence of calculi yields, in other respects, presumptive evidence of the disappearance of the tubercles of which they once constituted a part.* Bayles misconception, however, was natural enough, and vastly less serious than that which would connect phthisis, in the order of cause and effect, with ordinary catarrh, fever, the different exanthems and ordinary inflammation itself. But the latter, as I have shown, will not induce tubercle nor, *a fortiori*, phthisis at all. Inflammation indeed will not originate tubercle, but tubercle is perfectly competent to originate inflammation and, in point of fact, very often does originate it.† Another, but happily, a shorter lived misconception, was that tubercle resulted from a *zumé* or ferment. This pathological absurdity however was knocked, so to speak, on the head when it came to be discerned that the introduction into the current of the

* Die Heilung des Tuberkels kann auf mehrfache Weise zu Stande kommen, auf dem Wege der Obsolescenz, der Verkreidung, wie durch Elimination des erweichten Tuberkels. Sie haben jedoch sämmtlich als örtliche Heilungs-processe keinen Werth, wenn daneben nicht die Bildung neuer Tuberkel aufhört. Rokitansky, *Lehrbuch der Pathologischen Anatomie.* B. I, S. 308.

† Diese bei jeder Grösseren Menge von Tuberkeln entstehende Entzündung ist das Resultat des Drucks den diese auf die Capillargefässe ausübt so wie der dadurch entstehenden Stagnation des Blutes. Gluge, *Atlas.* Tuberkeln der Lunge und Entzündung.

circulation of various neutral substances, some of them morbid and some not morbid at all, led to results the same or similar as when tubercle itself was thrown in. Tubercle and the diseases of which it proves the concomitant and occasion, speaking of these diseases as in the order of cause and effect, is the result of no inflammation, no *zumé*, but is alone ascribable to local accumulations of the effete and dead carbon of degradation, deposited by reason of defective oxidation and, doubtless, would vastly oftener be eliminated and got rid of, were it not for the disastrous practice of respiring air already breathed and thereby wanting in oxygen, the very practice in truth which, if long persisted in, leads invariably to the deposit.

Tubercle, we must bear in mind ever, is no other than matter, once indeed living and organised but, as tubercle, become utterly dead and effete. It is made up, in fact, of the waste brute dejections of the economy, and possesses no other or greater vitality than does the dust on the causeway or the brick in the wall. Once deposited, supposing only that there are no additions to it, tubercle may subsist long years latent, it may be eliminated speedily, or it may become cretaceous. Much oftener, however, it gains progressively in dimensions and amount, replacing and more or less destroying the living tissues, until it become a burthen too intolerable to be borne. Nature essays, alas for the most part vainly, every effort to throw it off. The lungs, from the nature of their functions doubt-

less, are apt to suffer first. Quantities of tubercle along with other matter are expectorated but, for the most part, it accumulates yet faster than it can be got rid of. Sometimes even it drops into the cavity of the peritoneum or of the pleura, and I have known it in two or three such cases, after perpetrating terrible collateral mischief, to establish fistulous outlets through the umbilicus and between the ribs, occurrences which, although they may a little retard, do not long serve to evade death.

Not only then are the tissues superseded and in fact more or less effaced by tubercle but, one and all both internally and externally, they are further liable to be invaded by it to extraordinary and, in fact, little imagined extent. The superficial glands lungs and mesenteric glands I have again and again seen loaded to several, often many times their own weight. Gluge speaks of lungs which, even after the losses entailed by ulceration and long sustained expectoration, were actually five times heavier than in their normal state.* Mackintosh adverts to an instance in which these so precious organs, thus tubercle infested, were nine and three quarter pounds, or nearly four times as heavy as ordinary lungs.† How can any sufferer, it might well be asked, bear up against such an infliction. But the instances just mentioned are however far exceeded by one recorded by De Haen

* Dass die Lungen, so lange die Eiterung nicht zerstört, bis auf das fünffache an Gewicht zunehmen. *Atlas.* Masse und Gewicht der Organe bei Lungentuberkeln.

† *Principles of Pathology,* Vol. I, p. 450.

in which the tubercle laden mesentery weighed fully thirty pounds.* These vast aggregates, frightful as they are, are often yet not perhaps a tithe in amount of the whole, seeing that the tubercle masses, once they begin to undergo disintegration, however added to by fresh dead deposits, undergo incessant elimination and dispersion. I have seen cavities left by the escape of tuberculous matters quite as large as a small orange, while Wagner has encountered them the size of a mans shut fist.† But what do I say, the very sum and substance of the lungs are at times reduced to utter ruin and decay. Immense secondary and tertiary interstitial deposits of tubercle, crop after crop, surround the extant caverns, the walls of the smaller bronchi and of the blood vessels as Foerster states are invaded and destroyed,‡ while the caverns themselves, lapsing into each other as Roche puts it, leave little more than a thin shell of parenchyma intact.§

Our predecessors, unaware utterly of the real character and nature of tubercle, were in the habit of varying their designations according to the locality where the pressure of its presence was

* *Ratio Medendi.* Cited by Drummond, *First Steps to Anatomy*, p. 137.

† *Archiv der Heilkunde*, 1870, S. 525.

‡ Durch die enorme Verwucherung im interstitiellen Gewebe und in den Wänden der kleinen Bronchien, werden allmälig die Gefässe compromirt und veröden. *Handbuch der Allgemeinen Pathologischen Anatomie*, S. 227.

§ On a vu des poumons ainsi creusés, être réduits à une espèce de coque dont les parois avaient à peine quelques lignes d'épaisseur. Art. Phthisie, *Dict. de Méd. et Chir. Prat.*

most severely experienced. Tubercular synovitis was white swelling forsooth, spinal tubercle was termed Potts disease of the spine and nothing else, in the haunch it was hipjoint disease indeed, when it extended to the psoas muscles one heard nothing of tubercle but only of psoas abscess, in the adult larynx and trachea it became *phthisis laryngea*, since in the infant at least as Joseph Frank observes, it is rarely or never as such encountered.* Mackenzie, I may observe, met but three cases in which *phthisis laryngea* was not concurrent with tuberculisation of the lungs, and out of several thousand cases but three recoveries.† Finally, when tubercle assailed the ears, eyes, skin, smaller articulations and subcutaneous glands, it was designated scrofula or the swines disease.‡ No appellation in truth was too absurd to bestow, no explanation too ridiculous or unfounded to utter, and what is worse to find acceptance and belief. The common character and origin of all tuberculous affections, as likewise their invariable sequence on rebreathed air, was not once admitted or even suspected by any one. Indeed, to a very great extent, it is unhappily the case still.§ Therapeutic expedients, such as snail and vipers broth, the lizard and the scorpion, cauterisation of

* *Praxeos Medicae Praecepta Universa*, § Phthisis Laryngea.

† Diseases of the Larynx, Reynolds, *System of Medicine*, V. III.

‡ Ergo phthisis est infinite varia, pro varia parte affecta diverso nomine gaudet e. g. phthises pulmonalis aut hepaticae, aut splenicae, aut mesintericae, aut nephriticae, et sic porro. De Haen, *Ratio Medendi*, Cap. XXVII, De Virtute singulari quorumdam medicamentorum.

§ C. and T. Williams, *Pulmonary Consumption*. London, Longmans, 1871.

the helix or antehelix of the ear, friction which I saw continued by rubbers acting under medical advice in Edinburgh for entire months together, the imposition of some dead felons hand, drinking out of human skulls, living in a cowhouse or with sheep in ones chamber, the royal touch, lastly codfish oil of which greasy and therapeutically valueless remedy Bennett tells us seven hundred gallons are dispensed by a single shop in Edinburgh,* together with a hundred others equally senseless grotesque and useless, were and are by turns resorted to and abandoned, landing us, as Phillips remarks, in the very middle of the nineteenth century without, as he avers, the discovery of a single remedial medical agent.† Greatrakes, unconscious impostor, held sway for a brief period only, but the singular and pernicious superstition of the kings touch subsisted for entire centuries. Whereas by the grace of God, so runs the vainglorious proclamation of the first Charles, the kings and queens of this realm, his now most excellent majesty not less than any of his predecessors, have had for ages the happiness by their sacred touch and invocation to cure those afflicted with the kings evil. The litany, recited during the practice of the touch, in the seventh Henrys reign is curious in the extreme, and well deserves the consideration of those who would know to what debasing lengths mans credulity and folly can run. One thing however in this litany is true,

* Reynolds, *System of Medicine*, V. III, p. 575.
† *On Scrofula*, p. 255.

and one thing only, and that is where the evil, otherwise scrofula, otherwise tubercle, is termed a most grievous and filthy disease, a designation which this vile and infinitely disastrous scourge unhappily merits not less now than in days gone by.

The simple, infinitely reasonable, and as I trust conclusive theory which I have set forth to the contrary notwithstanding, every species of illusory vain and untenable hypothesis as to the origin of tubercle has been put forward and indeed continues to be put forward up to the present time. It was however a real move in the right direction when it came to be stated by Carswell Rokitansky Berard and others, that so far from being an abnormal living growth, tubercle was alike bereft of life and organisation.* Yet this led to no really practical or useful inference until I pointed out that tubercle was not only as thus dead and unorganised, but that it was in reality no other than the effete and defunct hydrocarbon of the organism, unoxidised and unexcreted by reason of the defective imperfect discharge of the respiratory act and consequent insufficing hematosis of the blood. Baudelocque indeed in the instance of scrofula, Fourcault in that of phthisis, both set forth that these maladies, their origin regarded, had to do with air fouled and tainted, short of which as Baudelocque most truth-

* Der Tuberkel besitzt keine ihm eigenthümlichen Gefässe. Es finden sich wohl zuweilen Gefässe in grosseren Tuberkelmassen vor, allein es sind die Gefässe des erkränkten Gewebes um welche die Tuberkelmasse sich herum gelagert hat. Rokitansky, *Lehrbuch*, S. 300.

fully and emphatically maintained scrofula cannot subsist or be.* Fourcaults declaration with regard to phthisis is hardly less explicit.† But these inquirers, however great their merits, were severally unconscious of the really common origin and fundamental identity of phthisis and scrofula. They did not know any more than do some who treat of these matters now, that consumption is no other than scrofula of the lung and that scrofula itself, as a manifestation of tubercle, is but phthisis so to word it of the superficies.‡ Neither were they at all aware that it is not simply impure air that is provocative of the maladies in question, but only air loaded with the poisonous excreta of prior respiration, and that air otherwise the most foul and stench fraught, if so be it is not rebreathed air, will never, as the immunity of nightmen and those who work in knackers yards declares, incur tubercle. However unpleasant are the malodours which these poor men are called upon to encounter, they at least avoid the curse of rebreathed air and, by reason of their open air life and action, escape tubercle along with it. This remarkable immunity, indeed, was some years

* La condition indispensable du developpement de la maladie scrofuleuse réside, comme je crois, dans la viciation de l'air au milieu duquel on vit. *Études sur la Maladie Scrofuleuse.* Preface, p. xvii.

† Pour préserver l'homme et les animaux des affections tuberculeuses il faut les soumettre habituellement dans l'état de la liberté aux influences de l'atmosphère. *Maladies Chroniques,* p. 24.

‡ Scrofulose und Tuberculose sind also nur zwei zu unterscheidende Modificationen desselben Krankheitsprocesses. Gluge, *Atlas,* § 3, Schlussfolgerungen.

since, in entire misapprehension of the tenor of my argument, flourished in my face by the late Sir James Simpson in the physiological section of the British Association in Glasgow. But I pointed out clearly at the time that nightmen owe their privilege, so far as it extends, to the same causes which exempt other persons as well, and this simply because they are not habitually constrained to breath air deficient in oxygen and loaded with the dead excreta of prior respiration. But of this fact Baudelocque and Fourcault, as I have just stated, along with him were entirely unaware. They did not divine that tubercle consists but of the dead excreta, unoxidised and unexcreted by reason of an inadequate supply of that divine *pabulum vitae*, as the wise man of Cos termed it, the only safely respirable and, our needs regarded, not to be exhausted outer atmosphere.

Often and often has it been noticed that natives of warm climates, man and brute alike, when leaving the countries of the sun they come to abide in cold ones, are prone to contract tubercle and perish. Broderip and Reynaud furnish instances in the case of monkeys,* Pearson in that of negro boys brought from Africa to England for their education.† The easy but, in truth, entirely fallacious inference was that warmth *per se* yielded immunity from phthisis and, on the other hand, that cold was directly provo-

* *Zoological Recreations.* Des Affections tuberculeuses des Singes, *Archives Gén. de Méd.* Cited in my *Consumption as Engendered by Rebreathed Air.*

† Cited in Phillips, *On Consumption.*

cative of tubercular consumptive disease. What however are the deplorable realities of the case, why simply this that scrofula and consumption, the factors which as I incessantly allege are alone productive of these maladies being present and to hand, are often only less frequent in the regions of the sun than in those of ice and snow. Persons afflicted with scrofulous sores are known to haunt the streets of Canton, just as the same painful and scandalous spectacle may be witnessed in our thoroughfares at home. At Pekin, M. Morache informs us, pulmonary phthisis characterised by excessive hemoptysis, is one of the principal sources of human mortality and, at the same time, in strictest relation with overcrowding.*

Tubercular disease in truth is inevitable when, as in the barracks at Tobago described by Tulloch in 1826, the indoor allowance of air space is limited, as it was in Tobago, to some two hundred feet cube offensive and fetid utterly. In effect, in this island as in Jamaica, phthisis proved† proportionally more frequent than in England or even the Canadas themselves.‡ The death rate from phthisis in Victoria indeed not only equals what subsists in

* La phthisie pulmonaire est l'une des principales causes de la mortalité. Des hémoptysies d'une abondance remarquable déterminent de nouvelles réactions inflammatoires, et bientôt le poumon se creuse de cavernes. Cette fréquence de lésions pulmonaires graves est manifeste, comme dans presque tous les pays, elle est en rapport avec la misère de la population et son incombrement dans des locaux insalubres. *Pekin et ses Habitans*, Étude d'Hygiène, Paris, 1869, p. 152.

† Drysdale, *Alpine Heights and Climate in Consumption*, p. 12.

‡ Parkes, *Manual of Practical Hygiene*, p. 205.

Europe but, in Melbourne, surpasses what obtains in London itself.* A medical man of high character and great intelligence, holding an official position in the far interior of Victoria and who had preserved the statistics of his practice for years states, that notwithstanding the warm dry climate, living much in the open air, and ample supplies of milk fruit and vegetables, the phthisical death rate is nine and a decimal or nearly ten percentum.† One out of three of the adult population of Melbourne, dying between twenty and forty five years of age, Mr. Thomson states, perishes owing to tubercular disease.‡ In short within the space of five years or from 1865 to 1869 and six months of 1870, two thousand one hundred and forty persons died of phthisis in a population all told of but one hundred and seventy thousand souls.§ Nevertheless, among eighty thousand persons, sleeping by night and spending the day most part in the open air at Bendigo, a single phthisical person it is matter of perfect notoriety was nowhere to be seen.‖ What inference then other than one in all respects favourable to my conclusions as to the genesis of tubercle from insufficing oxygen and rebreathed air by night especially, can be drawn, when we find among the same class of people and in

* *Mount Alexander Mail*, 13 June 1870.

† *Australian Medical Gazette*, Clarson and Massina, Melbourne Aug. 1871.

‡ *Supposed Influence of Climate on Phthisis*, cited in *British Med. Journ.* 6 Jan. 1872.

§ Thomson, *Digest of Legislative Return of Deaths from Phthisis in Melbourne.*

‖ *Melbourne Argus.*

the same climate absolute immunity from tubercle among those who spend their lives in the open air and, on the other hand, a mortality really terrible in the case of persons who pass their days within doors, their nights in airless stagnant and in fine breath poisoned chambers. In India, during the four years ending 1864, Dr. Macpherson states that the death-rate among the children of European soldiers in Bengal, to what extent from tuberculous maladies is left to be inferred, was not less than ninety four, while in the six years ending 1869, it rose to the terrible maximum of one hundred and forty five per thousand.* All these things display a frightful disregard of the laws which govern vital action and the general conservancy of human animal existence, and yield I conceive an overwhelming plea for the universal recognition of and adhesion to my views.

Two or three years ago in a public conveyance through one of the London suburbs, I became aware of a delicate sickly looking youth, my vis à vis, whose head and neck were secured to and supported by a curved iron fixture, shaped somewhat like the letter T. Struck with so uncommon a remedial appliance, I entered into conversation with the wearer, and learned from him that he was, so to speak, eaten up with the evil, the evidence of which indeed, in the shape of sores and cicatrices, was more or less visible whenever he turned to speak. I urged the poor young fellow strenuously to cast aside his iron neckstay and betake himself for

* *Indian Medical Gazette*, Aug. 1871.

it was then the proper period to Margate, briefly to keep his window open day and night and always, a procedure which he assured me was entirely new to him, and to which no one had ever turned his attention before. What examples indeed of scrofula, this vulturous scourge, what invasions of texture, what lacerating sufferings have I not a thousand times encountered. Not long since, I saw a little boy, the child of humble parents, a perfect angel of sweetness beauty and intelligence, the sadly premature intelligence begotten of suffering, whose knee was tense swoln and miserably inflamed. Amputation or resection, frightful alternatives of the latter of which I have just witnessed an example, alone could preserve and yet hardly preserve his young life, for the knee was not the only tubercle stricken portion of the childs poor frame. A lad of twelve or thirteen years of age, whose groins were occupied with knotted struma, some of the growths as large almost as turkey eggs, was recently brought to me, and about the same time a female teacher with a scrofulous tumour in the neck not less I am sure in dimensions than her own clenched hand. Antecedently, I had treated a lady of twenty years or so of age, in whom a hideous collar of characteristic strumous ulceration extended quite three parts round the neck. The poor spent pallid thing, otherwise weakened and exhausted by the copious sanious outflow from her sores, had been half poisoned, so to speak, with chloride of barium fish oil and other absurd nostrums which her half distracted parent

had constrained her to devour. And yet, with simple water dressings, alternate preparations of iron, prolonged horse exercise, the sea air, good meats and generous wine, with open windows at all times, her sores healed, her general health improved, in short such amendment followed that, if only the hideous scars and cicatrices could have been got rid of, her recovery might well be deemed complete.

But what examples might I not adduce, what instances recite, in corroboration of my unimpeached and I believe unimpeachable position that to excessive indoor life and occupation by day, coupled with repose in crowded chambers sordid with the feculence of air already breathed, is entirely and altogether owing the lamentable prevalence of scrofulous consumptive tubercular disease. Circumstances to unreflecting observers and onlookers apparently very slight, such as sleeping with the respiratory outlets to wit the nose and mouth covered up, or with the bed perhaps in some already curtained alcove side on to the wall, tend to issues often the most serious.* Young children, for example, sharing the couch of their seniors, with heads perchance immersed beneath the bed coverings, incur tubercle how frequently those most familiar

* Le développement de la maladie dépend de la manière dont les enfants sont élevés. S'ils restent soumis aux influences qui ont rendu leur parents malades ils le deviendront infailliblement. Ils eviteront de l'être, si par l'effet du hazard ou par des soins bien dirigés ils sont soustraits à l'action des mêmes causes. Baudelocque, *Études sur les Causes de la Maladie Scrofuleuse*, p. 189.

with their maladies alone best can tell. Scrofulosis and pulmonary consumption, observes Niemeyer, are much more frequent in asylums for foundlings and orphans, in reformatories and prisons, and among artisans who work all day in close rooms, than in those who are much in the open air. The objection that this frequency in such places is caused by other agencies than the want of fresh air, does not stand the test of experience. Too little regard is paid in practice to these striking facts. Numberless delicate children with swollen lymphatic glands, are kept for five or six hours daily sitting in school, besides tasks at home, provided only they take a good deal of cod liver oil, as if only cod liver oil, Niemeyer naïvely remarks, could replace fresh air.* Too often, in truth, the sad disastrous sequence is wholly overlooked, until it prove too late effectively to deal with it. Unhappy prisoners too, boxed up in narrow and almost unavoidably ill ventilated cells, debarred alike from generous diet and stimulating drinks, poorly clothed, depressed in spirits, and restricted to sedentary pursuits, so different as the lamented Baly observed from their usual wont, become tuberculous just as the poor brutes themselves do under circumstances analogous. In a quite recent account of Sing Sing prison it was stated that the cruel and in fact infamous practice there subsisted of shutting up refractory inmates in stone built iron doored cells utterly bereft of light

* *Lectures on Consumption*, Syd. Soc. Bäumlers tr. p. 62.

and air. Alas, I have witnessed doings almost equally iniquitous without going so far from home. Once, indeed, in Philadelphia I went to look at a recently constructed prison in which there were dens adequate, more than adequate, to induce tubercle in any one so hapless as to be immured in them.

Haply a day must come, when these ruinous and deadly doings, along with the disastrous errors on which they are founded, shall for ever disappear before the inroads of a sounder pathology, therapeutics more reasonable. For long years I have striven to promulgate such a pathology, as well as a θεραπεια conformable. I do not, I trust, argue in a vicious circle, like some who actually parade their errors, *causa pro causâ*, as their justification for maintaining them. By direct observation and unassailable inference, as well as by the strict logical process of exclusion, I have I trust established a completely sufficing theory in respect of tubercle and its genesis. If true, and I maintain and affirm that it is true, it should experience instant attention and universal recognition. A true theory, indeed, in respect of the production of tubercle, is of surpassing nay inexpressible moment, and such a theory I hold is mine. The question really, is one of life or death to millions. I have not the slightest desire to beg the question. I ask for nothing but a hearing, and further, if these views prove sound, their immediate universal recognition and adoption. Every one, in reality, is quite as much interested in these

matters as I am myself and, with careful and candid consideration, approximately as competent to decide upon their merits. Some, however, there are who fill or assume to fill the judgment seat, and who are not altogether so infallible as they may deem. *Non contingit cuivis homini adire Corinthum*, as shrewd Horace observes tersely. Let us be as prudent and cautious as we please, nevertheless some degree of boldness is needful absolutely in respect of dealing with ridiculous and death fraught delusions, else the guilt of passively if not actually countenancing them, must inevitably lie at our own doors.

Consumption, observes Young in his elaborate treatise on the malady, penned little more than half a century ago, is in almost all civilised communities the most extended and inevitably fatal of diseases.* That it is extensively fatal I concede freely, that it is inevitably so, I for one deny utterly. So far from it the mortality from phthisis, I assert maintain and were it with my latest breath must declare, may be superseded utterly and universally when we will. By a striking and altogether marvellous alternation of function, each local act of life gives place, *seriatim*, to one equally local of death. These acts, if not entirely synchronous are, at any rate, of all but simultaneous occurrence. The heretofore vital element, become defunct, is displaced by newer elements to die and be replaced, so long at least as life and organism endure, in turn. We do not know the exact immediate nature of the

* London, 1815.

physical changes which attend and precede the integration and disintegration of tissue but, at any rate, the dead and effete azote sulphur lime and phosphorus escape for the most part from the kidneys, while the equally dead and effete carbon finds its main outlet from the lungs.* But if only air already breathed prove a portion of our respiratory pabulum, natures all perfect engineery is interfered with if not set aside, and carbonaemia, for the inference is inevitable, begins. The dead and effete carbon, as thus, is not burnt off or burnt off adequately, but silts up so to speak within the living breathing organism and, unless the process be in time effectively suspended or inverted, sooner or later in the garb of tubercle consummates its final and inevitable destruction. The already breathed and again breathed air, I say, proves indeed the sufficient cause of tubercle as of each and every tubercle engendered malady, and thus, unless I signally err, is cleared up at last the hitherto unresolved and, until I took it up, perfectly insoluble problem of the origin of tubercle, as well as of the final destination of the unoxidised carbonaceous waste.

The solid resultant *caput mortuum*, the in fact effete and, because unoxidised, uneliminated dead residue, is no other than tubercle while, conversely, tubercle, as I affirm, is indeed the uneliminated because unoxidised effete carbon. If these conclusions be well founded and, being so, shall receive a well justified universal assent then, of very neces-

* Beale, *Life Theories.* Robin, *passim.*

sity, are they destined I conceive to revolutionise the hitherto incongruous and simply murderous pathology of tuberculosis and tubercle, as well as the perfectly unavailing and contradictory treatment of extant tubercular disease. Not only, in fact, do they involve this, but they also further involve the potential and, as I believe, actual extinction of tubercle and tubercle begotten inflictions, with all their direful ravages, from amid our kind.

TUBERCLE AND THE CRUCIAL TEST.

British Medical Association, Oxford, August, 1868.

The alchemists of old were wont to impress a crux or cross on their bocals and their pots, with a view perhaps to propitiate the higher powers and, peradventure, coerce the better the lurking elements to do their special bidding. Hence is derived, we may conjecture, the epithet crucial, as applied to any clenching test or argument calculated to shed conclusive light on some disputed point of human inquiry. In many cases a single criterion suffices while, in others, a whole series of such may be required to enforce conviction and secure assent. But it also happens that there are sometimes instances in which a crucial test subsists ready, and as it were to hand, requiring in fact to be but looked at in order to avail. Now, I believe and assume to show that this is actually the case, oftentimes at least, in regard of the cause of tubercle and tubercle engendered maladies and that, while we may if so minded induce these in everyway abnormal

and anomalous conditions in the inferior animals, there are facts which show most peremptorily that tubercle, whether incurred from voluntarily addictions or as the result of some sad necessity, ensues in our own species likewise from an agency, to wit the habitual inhalation of a breath fouled atmosphere, absolutely identical with that by which, when subjected to its influence, we produce tubercle arbitrarily in the animals to which I have just referred. If people would but look at it, if only they would think and observe, they must needs perceive that the proper efficient performance of the respiratory act and adequate hematosis of the blood, involves of very necessity the sustained and constant inspiration of air no portion of which has previously passed through the living breathing vitals of brute or man. No, a breath tainted atmosphere may not a second time with impunity be respired. The thing in short is simply impossible. If indeed only a sufficient knowledge of the natural condition of mans life and organisation, as connected with aerial influences and revealed in their entirety by sciences allied to medicine and to each other had generally prevailed, then these pages would have proved superfluous since consumption would have remained unknown.*

The position then which I take up and which it is my pretention to uphold is that the morbid accumu-

* Toutes les parties de la physique générale se pénétrent mutuellement. Elles forment un tout. Si on l'a divisé c'est pour en faciliter l'étude. Deschanel, *Traité de Physique*, p. 9.

lation termed tubercle is induced and alone induced by again and again inhaling air already breathed. For if only this be done and done habitually, the individual in effect is poisoned by the poison of his own excretions and tubercle becomes imminent if not inevitable. Whereas if air, the same air, in fine air already breathed, do not constitute any portion of lifes pabulum, tuberculosis and tubercle become alike impossible. The notion of hereditary or inoculable tubercle, then, is simply untenable preposterous and absurd.* There is scarcely a family, observes Carmichael and not Carmichael alone, some member of which scrofula is not sometimes found to implicate. Occasionally, indeed, we find quite healthy parents with scrofulous children, while again scrofulous parents have perfectly sound offspring. Instances not a few are recorded, I have met such myself, in which the grandparents are affected, while the intermediate generation has proved entirely exempt, a circumstance which, as the observer just named remarks, is at variance utterly with the notion of any hereditary or transmitted virus.†

Tubercle is not inherited, simply because there is no influence or virus to inherit. We might, in this instance at least, just as correctly speak of inheriting a broken leg or other casualty. In some few, very

* Fuere e recentioribus varii qui similes progeniei et parentum morbos à simili diaetâ et vitae genere potissimum repeterent. Kortum, *De Vitio Scrofuloso*, t. I, p. 287, cited by Baudelocque. Si verè haereditarium esset malum omnes fratres sorororesque invadere deberet. White, *De Morb. Scrof. Id.*

† *Essay on Scrofula*, p. 100, 110.

few cases, indeed, the marvellous depuratory influence or what I should so esteem of the placenta notwithstanding, tubercle has been detected in the foetus, the mother in this case, having already been subjected to the influences productive of tubercle. The cause here at work, however, is a synchronous not a transmitted one, and is no more the result of paternal or maternal descent than would be an impromptu catastrophe that should jointly implicate both parent and offspring. So rarely, however, is tubercle discernible in the foetus or suckling, and were it hereditary the result would be quite otherwise, that pathologists of note go so far as almost to deny the very possibility of its occurrence. Never observes Rokitansky is tubercle to be met with in the foetus or sucking child.* If indeed tubercle be not hereditary in the sense claimed for it, and nothing is more common than to find some children in a family scrofulous and tuberculous while others are perfectly exempt, then, is the *à fortiori* inference inevitable that none of the maladies of which tubercle is the *fons atque origo*, are hereditary either.† In other respects, scrofula and tubercle are terms virtually convertible and, whether it be of the larynx trachea hip knee spine

* Die Tuberkel kommt bis ins hohe Greisenalter hin. Vorzüglich jedoch im Jünglings und Mannesalter, dagegen im Fötus und auch im Säuglingsalter nicht vor. *Lehrbuch der Pathologischen Anatomie*, § 308.

† Aliqui liberorum prorsus à morbo sunt immunes, nullumque ejus vestigium ostendunt, aliis interim ab eo sub variâ formâ detentis. Kortum, *Opus Citatum*.

elbow shoulder wrist hand skin bronchial or other glands muscles brain or lungs, speaking of the occurrence of tubercle in the order of cause and effect, it is never handed down from parent to child or in other words hereditary.* This corollary must needs be true, at least if my first position itself be so, namely that tubercle in every instance is the sequel of the abnormal and halting performance of the respiratory act and consequently the insufficient elimination of the effete carbon of degradation. For tubercle, as with *totis viribus* I affirm maintain and declare, is alone induced by the long protracted habitual inhalation of air tainted by the poisonous products of anterior respiration, and in no other fashion form or wise whatsoever.

In effect, if tubercle be not the dead and retrograde detritus of the economy which, not being oxidised and extruded, is retained *pro rata* within the living breathing organism, what I would inquire becomes of this detritus. For if only the effete carbon, as my fixed firm thesis declares, be but adequately burnt off, then is tubercle impossible. If however the excrementitious carbon be not burnt off or oxidised, as with equal insistency I maintain and declare, then are tubercular deposits inevitable. Were the general intelligence of the community, of the medical community in particular, only less

* Die Häufigkeit des Tuberkels ist sehr verschieden in Lungen, Darmcanal, lymph bronchial und abdominal Drüsen, Larynx, serose Häute, weiche Hirnhaut, Gehirn, Milz, Nieren, Leber, Knochen und Periost, Uterus und Tuben, Hoden mit Prostata und Samenbläschen, Rückenmark. Rokitansky, *Lehrbuch*, B. I, S. 306.

completely biassed and prepossessed by too often vague illusory and quite baseless hypotheses no one, I think, these truths or what I consider truths being properly set forth, could well arrive at any other or different inference. The effete unoxidised carbon, I say, is converted into, in fact is no other than tubercle. But, if this be denied, what I would again ask becomes of this effete and yet not oxidised carbon. For it is there, solid inalienable inexpugnable, like so much lead or iron, and cannot possibly vanish into thin abstraction were my opponents to shut their eyes never so obstinately. Refuse assent as much soever as you please, you cannot thereby convert the effete carbon into nothingness, any more than you can so convert its adamantine prototype and analogon the diamond, by any conceivable effort or exercise of volition whatever. The lucid intelligence of a child even might respond, but not that of the man who declines to think or reason for himself, and whose intellect has, so to speak, become petrified by the ritual in accordance with whose dictates it has proved his good or evil fortune to be reared. To run with the stream, to follow in the track, does uncommonly well when we are in the right, but answers very badly indeed when we happen to be all in the wrong. The successive integration and disintegration of the constituents of the living organism, the carbonaceous constituents among the rest, atom by atom, particle by particle, are rapid as they are incessant, and to interrupt or in anywise interfere with this process as the

respiration of already breathed air more or less must needs do, is to induce tubercle in the first instance, and destruction sure and certain in the last.*

Solvitur ambulando indeed, for most truly he who runs may read. Air, pure air, being once respired, becomes charged with from some four to five per-centum of carbonic acid gas, the resultant of the union of the dead carbon of mans economy with the oxygen of the inhaled circumambient atmosphere. And thus it is, just so much atmospheric oxygen, a little less a little more, replaces during each several act of perfected respiration so much carbonic acid as ensuing from the slow combustion of the effete carbon of degradation. It might indeed be well supposed that the seventeen or eighteen percentum of residuary oxygen, residuary I mean in the once respired atmosphere, should yet further suffice to meet the requirements of the living breathing organism but, with a certain and very limited reserve, we find it in reality quite otherwise. Air indeed replete with animal impurities, the foulnesses of prior respiration, breathed were it but for a brief period, induces speedy death. For life, the life of the body, expires as flame itself expires when flame is immersed in such a medium. A very small proportion of carbonic acid, the resultant of the prior combustion of the dead carbonaceous

* Équilibre tellement nécessaire que, si les matériaux dévenus inutiles n'étaient pas emportés, l'homme périrait aussi sûrement que si la nourriture ou l'air lui manquait. Littré, *Médecine et Médecins*, Paris, 1872, p. 325.

tissues, as an ingredient in the habitually respired atmosphere, conducts inevitably to the dead deposits nicknamed tubercular, as also to those other disastrous sequences with which we are all of us only too familiar. The presence of such an ingredient I say, to any really appreciable or considerable extent, if only it prove a persistent presence, undesirable in the first instance, becomes I repeat very certainly lethal in the last. The only way in truth in which carbonic acid can be safely and habitually respired, is in the infinitesimally minute, and therefore perfectly safe proportion supplied by the providential hand of nature herself, and to exceed which, habitually and materially but entails immediate hurt and inevitable eventual destruction.

We neither could, nor if we could would, subject human beings directly to the operation of the agencies which, as I allege, are productive and alone productive of tubercle. And, yet, we still do so subject them, not indeed of *malice prépense* but indirectly, through our laches, our crude ignorance, and our singular persistent indifference. Natural law is all too much unheeded. On every side, in fact, there is a surpassing disregard of the grand requirements of animal life and the imperative needs of our inexpressibly magnificent organism. The morbid results, however, accruing from perverted respiration are to my mind, and as I think they ought to be to every other unbiassed mind, just as conclusive as if they had resulted from some cunningly devised experiment itself. They have, I submit, all the force and

relevancy of an *instantia crucis* or crucial test were it one never so elaborately prepared and carefully conducted. Unless, therefore, we go the extreme length of alleging that accurate observation coupled with induction, other circumstances being alike, cannot compare with experiment, and fully alive to Claude Bernards shrewd caution that we should not confuse the *post hoc* with the *propter hoc* and as thus argue in a vicious direction, we must I think perforce admit that as proof one is just as evident convincing and reliable as the other.* In point of fact then, at least to every dispassionate observant investigator, experience and experiment, since as words they have but one root, are in essentials and taken in strictness things virtually one and the same.

The total or almost total absence of ceiling or cornice ventilation, along with the baleful habit of sleeping with closed doors and windows, in curtained beds, alcove couches, or couches side on to the wall, perchance smothering the respiratory outlets beneath the bed coverings, as well as the evil practice of sitting and lying in chambers with the head and shoulders raised above the zone of air as renewed by open fire places in otherwise overcrowded living and sleeping rooms, tends to load and in effect does yet further load the already breath tainted atmo-

* Dans les expériences physiologiques où l'observateur dispose jusqu'à un certain point des circonstances, il dévient de précepte d'éviter cette cause d'erreur, *post hoc ergo propter hoc*, la plus facile de toutes. *Leçons sur la Physiologie et la Pathologie du Systeme Nerveux*, T. I, p. 17.

sphere with the reeking deadly products of prior respiration, and to induce tubercular deposits in the lungs and elsewhere, with frightful inevitable certainty. If indeed the mode of living by day be one of considerable open air exposure and activity, the organic blight more or less consummated by night will be proportionately minimised. But it proves sadly otherwise when both by night and by day circumstances combine to induce the respiration of an already spent, previously breathed, and therefore in every way vitiated and lung destroying atmosphere.

What visions of suffering, ah me, what pining misery, what grief of relatives over the untimely extinction of else promising careers, do not the crowded memories of bygone years recal. The wars, plagues and autodefes of the past, the rankling ravening diseases of the present, by whatever concatenation of human folly ignorance and wretchedness induced, do not otherwise bear almost a moments comparison with the prodigious and yet in every way gratuitous inflictions occasioned by tubercle and tubercle engendered maladies. And thus must it happen ever when nature is so persistently and flagrantly insulted and her laws are so calamitously infringed, that law in especial which bids us, day and night and always breathe air only no portion of which has passed through the lung of man or brute before. For when air prebreathed is breathed again, habitually, then it is that tubercle begins to assert its dreary devastating sway, and that ravages ensue which desolate the world and decimate our kind.

The destruction owing to tubercle and tubercle induced maladies, implicating as they may well be said to do almost our entire species, is harrowing indeed. But even exclusive of these open and evident ravages numbers, actually if not manifestly phthisical, are hurried out of existence by other and superadded maladies, and therefore are not included in the lists of the tubercle stricken. How often for example is tuberculosis of the mesenteric glands which, according to Walsh, subsists in from one fifth to one third of all phthisical adults, quite undetected in life.* I have repeatedly indeed had occasion to surmise its existence when phthisis of the lungs was, if actual at least not prominent, and in one instance to a really prodigious extent when, after the most careful postmortem inquiry I could not detect a single tubercle in the lungs. No announcement indeed is more common in the records of postmortem examinations than that tubercles were detected in such and such viscera, and under circumstances wherein these tubercles were not considered whether directly or indirectly as the immediate cause of death. Such instances, although in reality tuberculous, are not so recorded in the general bills of mortality. The greater in truth is the amount of atmospheric deterioration, as ascribable to foul respiratory egesta, and the more prolonged and incessant the immersion therein, the sooner do the evil results of such immersion manifest themselves. In effect, there are perfect multitudes who, their indoor existence

* *Treatise on Diseases of the Lungs*, 4th ed. p. 435.

at least regarded, may well be said never to draw a single entirely unpolluted breath in their lives. In some few instances, whole years may indeed elapse ere tubercle, being present, shall conduct to disastrous issues, but much more frequently the result is that the sequent respiration of air prebreathed, within periods that sometimes may be reckoned by months, is found to engender serious deposits or to render those already subsistent fatal.

All breathing creatures, man and brute inclusive, are subject to the infliction of the dead carbonaceous deposits which we call tubercle, conditioned however, by the greater or less severity of the influences which, as I allege, alone call them into being. No immunity the efficient causes, those to wit so often iterated, being present and to hand is so much as possible. A stalwart frame, prior health the most unfaltering, the exactest modes of living, will not in the very least avail if only the evil practice of inhaling habitually air prerespired begin. Conversely, a physique the most enfeebled, functions halt and faltering, predecessors and congeners the most tubercle stricken imaginable, will not entail it in a single one of its multifarious forms and aspects so long as the influences which I assert and declare are alone productive of it do not subsist. How many are the instances which I have known, alas how familiar are they to almost every practitioner, wherein men and women more especially women, healthy up to a given period, say that of marriage, have subsequently become fatally tubercle stricken

by reason then and after of having contracted the infinitely baleful and destructive practice of breathing habitually air wanting in oxygen and further fouled and tainted with the already shed respiratory excreta. No living thing indeed escapes. Neither position nor wealth nor personal stamina will in the very least avail if only such an atmosphere be continuously and persistently inhaled. The averment, therefore, whether direct or inferential, that animals and man in certain countries, or in any country whatever, can with perfect impunity, day and night and always, respire an atmosphere prebreathed and tainted, for really it comes to this, is at once contradictory untenable and outrageously absurd. It is in truth at utterest variance with the laws of life and organisation, as well as with the physicovital relations of our economy to the wonderfully extended aerial medium in which we are unceasingly plunged, and, therefore, in absolute disaccordance with nature and with truth.

Of course it is open to all of us to take up whatever position we have a mind to, but if any one choose deliberately to maintain a false one, he does so at imminent risk and peril, the risk and peril which we all incur and to which we more or less subject others as well, whenever we play fast and loose with the great vital interests of humanity and our kind. My extended personal experience, the evidence at once direct and indirect which I adduce, the various essays treatises and *viva voce* utterances which I have so profusely laid before the world, to

say nothing of my own emphatic declarations founded on a multitude of facts entitle me, unhesitatingly and with I believe entirest certainty, to affirm that there is no possible avoidance of tubercle and tubercle induced disease when the condition of things which I have named as productive of tubercular degeneration is in proximate and permanent activity. And next, the condition in question being absent, it is just as impossible for the deposition of dead effete carbon to ensue as for water to run uphill or grass to grow upside down. It is therefore perfectly incorrect to maintain, would only for the poor sufferers' sakes that it were otherwise, that the Esquimaux never incur tubercle, and that Icelanders do not contract consumption. Tubercle, in truth, extends to the frozen north, it reaches the sweltering south, it prevails widely in the Canadas, devastates both the Americas, is present in the Indies East and West, nor is it wanting in Africa the Australias or the two inhabited New Zealand Isles. It may be said that I exaggerate, but were I even capable of such a weakness, exaggeration would here be beyond my power. The case in truth is one in which exaggeration itself is at fault, for no exaggeration could possibly vie with the frightful portentous reality.

Whenever and wherever natures eternally subsistent law is violated, a law coeval with our creation, a law which dictates that the same air unless renovated and purified by natures provident hand shall not be respired again, a law which trumpet tongued declares that not a second time shall air befouled and breath-

polluted pass through the living breathing vitals of man or brute again, then and there must tubercle and tubercle induced disease prevail. The Australian savage sleeping in the lee of his bark screen or gunyah, the gypsy in the copse, the Bedouin in his roomy tent, are severally exempt from the devastating scourge of phthisis and scrofula. Exempt also was the New Zealander in his pah until in an evil moment his imitative tendencies led him to copy with yet worse modifications and details, ventilation regarded, than our own the sleeping arrangements of Europeans, sweltering smothering in absolutely airless dens, twenty or thirty persons all night long together, thereby subjecting himself to the festering scourge of consumption which, no one stretching forth a hand to save, even now is swiftly sweeping a manly but luckless race away.

Nothing in fact can well be more impressive than are the instances which I have witnessed, one portion of a family not governed by the exigencies of respiratory law perishing utterly, while another portion so conforming has escaped perfectly. But cases in illustration are recorded by many writers, and such I have recited in my treatise on consumption.* What indeed can be more striking than the instance of the shepherd boy at Barèges mentioned by Bordeu. His food was a crust washed down with a little sour milk, his couch the sky covered turf which he shared with his sheep, *partageait avec ses brébis.* But taken in hand by a princess who had been attracted by

* *Consumption as Engendered by Rebreathed Air*, p. 123.

the health and beauty of the child, he was lodged in the close precincts of a palace, fed and clothed daintily, in such wise that within a twelvemonth he was carried off by scrofulous mesenteric disease.* A poor family, narrates Cruveilhier, comprising father mother and four children all overflowing with life and vigour, abandoned their country home and went to reside in a city cellar. They perished, one after the other of tubercle the father, whose employment lay much out of doors, alone excepted.† A family consisting of the parents and three sons, coerced by poverty, came to live in Paris. The father, previously a mason, with two of his sons obtained work in a paper factory in which they spent thirteen hours out of the twenty four. These three died, tubercle stricken, emaciated utterly. The terrified mother fled back to her native village where her infant, thus preserved from the fate of his relatives, became a robust and vigorous man.‡ Very impressive indeed is the narrative furnished by Orfila, touching certain French shepherds who, for all that they spent their days afield beneath the sunny heavens roaming the wind swept pastures, nothing the less were consumed by tubercle by reason of the dreadful atmosphere of the little ambulatory dens or caravans which they occupied by night.§

I need not again recapitulate what I have already

* Bordeu, *Memoire*, cited by Baudelocque.

† *Traité d'Anat. Pathol.* Tome IV.

‡ *De la Tuberculisation*, cited by Herard et Cornil.

§ Ils passent les nuits dans une cabane étroite qu'ils transportent partout où ils vont. La porte est fermée dès qu'ils y sont entrés,

stated touching soldiers sailors and police, in short selectest men in respect of health vigour and solidity, who yet were consigned in perfect shoals to destruction because of the poisonous respiratory feculence which they were condemned, and still unhappily are more or less condemned at least during their sleeping life, to breathe. In short, those who inhale, daily nightly and ever, excreta which the great river of animal life, to wit the blood, in the act of depurgation casts off, perish tubercle infected miserably. On the other hand, those who respire an atmosphere of which the full oxygen supply is not replaced by vilest lung excreta, at any time, escape invariably and always. Niemeyers evidence on this point is really very strong. Notwithstanding obstinate opposition, he observes speaking of a certain school, he succeeded in having it discontinued for a time, making the children pass the greater part of the day in the open air. He thus obtained results which surprised Niemeyer himself, and which compelled the parents to admit that the benefit far outweighed the heavy sacrifice.* The stunted offspring of Cornish miners condemned to efforts beyond their years, the children of the working classes in all our towns, the poor waifs of civilisation shut up in the Dublin House of Industry so scrofula beset as actually to have led people to imagine that their malady was infectious, are all

qu'ils tiennent également fermée pendant le jour. Six à huit heures passés dans un air altéré et qu'aucun courant ne vient jamais renouveler, telle est la véritable cause de leur maladie. *Études*, p. 166.

* *Clinical Lectures on Pulmonary Consumption*, New Sydenham Soc., Bäumlers tr. p. 64.

more or less victims of the same ruinous destructive influences.* Ignore or set aside these statements then who will, evade their cogency and relevancy who can, but if no one come forward with any reasonable or conclusive disproof, of unreasoning self contradictory and illusory disproof there has already been more than enough, then I am, I conceive, entitled to lay claim to such practical intelligent assent, for any other were simply vain as, when carried into action, shall suffice effectively to drive these hideous and abominable scourges, scrofula namely and consumption, for ever from amid our kind.

I have already adverted to the comparative exemption of the gypsy the Australian savage and the desert air breathing Bedouin, but the crowning instance perhaps of absolute immunity from consumptive scrofulous disease is that which is yielded by the people of the West Highlands, Argyle namely and the Hebrides. In these highlands and islands, wherein no single influence popularly and even medically considered productive of phthisis is absent, there, positively, no scrofula, no consumption, in short no tubercle engendered malady whatever is to be seen. The population occupies an extensive seaboard and islands of greater or less dimensions, islands and a seaboard in which nevertheless, some casual instance or sufferer from another shore excepted, the maladies which I have so often had occasion to name are absent absolutely. The rest indeed of Scotland is decimated by consumption, but

* Carmichael, *Essay on Scrofula*, p. 89.

not the West Highlands and Islands, not the Hebrides. Scrofula, observes Mackintosh, long a resident practitioner and lecturer in Edinburgh, as Carmichael as I have shown had done before him, is a malady with which some of the members of almost every family, at one time or other, are apt to be implicated. And yet all Scotland, by the adoption of proper measures, might be just as exempt from this abominable and disastrous infliction as are the districts which I have just named. Here then, amidst an important and in many respects intelligent community, occupying a region naturally as wholesome, the means and appliances of health regarded, as any on the habitable earth, we find the Registrar General and *fama clamosa* itself affirming that tubercular consumption is one of the most deadly of maladies, one which in point of fact cuts off twice as many as does typhus fever and enteric disease, the next most destructive of human inflictions, put together.*

The Registrar himself indeed expressly adverts to the special immunity enjoyed by the inhabitants of Argyle and the Islands but, exclusive of his declaration and the greater or less notoriety of the circumstance, the excessive rarity of tubercular outbreaks in the moist and misty Hebrides is further vouched for by Dr. Morgan, an English physician who, fortunately for the interests of science and of truth as well as of humanity at large, came to reside for seven years or so in Raasay, one of the islands in

* *First Detailed Annual Report for Scotland*, 1861.

question. Astonished, as well he might be, with the to him apparently so astounding anomaly as the complete or next to complete local absence of every form of tuberculous scrofulous disease, this accurate observer opened a series of written communications with the clergy and practitioners in medicine of the district at large who all as with one voice, and Dr. Morgan takes care to adduce their evidence severally and textually, assured him of the universality and unassailable certainty of the fact. Not a single instance observes Dr. Maclean of Mull had occurred among three hundred paupers in the course of three years, in Syree and Coll writes Dr. Anderson the disease is rare very rare, in Barra there were only four or five cases among eighteen hundred persons and in South Uist and Benbecula among six thousand but two or three annually, in Harris where the population amounts to four thousand Dr. Clark knew of but six instances two of which had come from Greenock in the course of thirty years, in filling up policies at Stornoway consumption the doctor always stated was unknown, in Sutherland among ten thousand persons the local practitioner had rarely more than one or two examples of phthisis on hands at once, Dr. Robertson of Gairloch met with four cases only among five thousand people in twelve years, the clergyman of Glenelg had not witnessed ten examples of consumption among thirty thousand persons in thirty years, the doctor of Portree did not meet twenty instances in as many years, and as for Dunvegan the resident

practitioner had not witnessed any case of phthisis whatever during the long lapse of sixteen years.* Could anything possibly be more conclusive.

Dr. Morgans paper, taken *in extenso*, is one of extremest importance, ought in fact to be in the hands of every one interested in the suppression of the fellest scourge now incident to humanity. It should be studied by those who oppose my views in order to abate and correct their misconceptions, as well as by those who favour them so as to strengthen and fortify their adhesion. Nor will any one, fresh from the perusal of these pages, in the face of what Dr. Morgan has stated and my own well sustained arguments and explanations, I think, find it easy to believe that it has positively been attempted to explain the immunity of the West Highlanders and Islanders from scrofula and consumption by their inhalation of the peat reek with which their poor cabins abound, cabins poor indeed in worldly gear, yet nobly endowed with the priceless ever freshly renewed oxygen, the all abounding and entirely unpolluted outer atmosphere. Peat enough in truth, and reek enough are discoverable throughout Scotland, but without the same immunity that subsists in the West Highlands and the Hebrides, and yet Dr. Morgans memoir, in every respect so vastly momentous, is far from being so generally known to English Irish and Scottish practitioners as it deserves to be. The contents in truth, graven in letters of brass if it might be, should be posted up all over

* *British and Foreign Med. Chirurg. Rev.* Oct. 1860.

Scotland so as to render every one effectively acquainted with the facts. Even Dr. Morgan himself, strange to say, seems far indeed from rating them at their real value. Singular in truth as it may seem, the very existence of Dr. Morgans paper with the Registrars published report in corroboration, together with the inexpressibly important particulars to which they yield testimony, had never so much as once been heard of by a Scottish physician of ability and position, with whom I was a few months since conversing on the subject of the local prevalence of consumption, until I pointed them out to him, so difficult does it too often prove to render the most vital truths known and appreciated even by those to whom, as dealing with the weighty problems of life and death, it is of such peculiar moment that they should be known.

These islanders then of the Hebrides, so fortunate in the enjoyment of their great immunity, abide for the most part in ceilingless partitionless hovels, each provided with a central hearth or side fire which, winter or summer day or night, is never once suffered to go out. In the roof there is a simple aperture of some sixteen or eighteen inches in diameter, in lieu of chimney, thus rendering a stagnant motionless and unrenewed atmosphere a perfectly impossible thing. The walls of these hovels, it seems, are otherwise chinky and pervious and, as for the door, it is seldom or never closed. The arrangement indeed is simplicity itself, but it is also one which is effective in the extreme. Science and art combined,

with constructive ability to boot, could hardly, ventilation regarded, compass a more perfect result.

And hence it is that day and night and always, the atmosphere of these poor, I perhaps ought to say these rich Hebrideans' dwellings, the excreta from mans lungs regarded, is never fouled, never prebreathed or impure, but ascends ever, escapes ever, so that by no colour of possibility, unless indeed they were to bury their heads beneath their bed coverings or adopt the horrors of civilisation, can the inmates respire again at any time their own already exhaled excretions. The dead carbon of degradation therefore, is oxidised incessantly, given out as well *pari passu* by the lungs, and at once dissipated in the immense, in fact boundless air flood that subsists everywhere around. There is therefore no arrest, were it for one single instant, of the expired effete excrementitious carbon of the blood, and of necessity no tubercular strumous deposit or tubercle begotten malady, no tabes of the mesentery, no consumption of the lungs or phthisical decline, no tubercle of the larynx trachea lymphatic or other glands, none of the brain or nerve structures, none of the spinal marrow or meninges, none of any of the inward viscera, no strumous affection of eye ear bone skin gland or joint whatever, and no so termed scrofula either. In short, there is virtually if not actually, no tubercle or tubercle engendered malady or manifestation of any sort or description whatever.

Thus then I have, I would submit, established in

its fullest force and integrity, and without leaving any loophole or opening for quibbling or evasion, the *instantia crucis* and final test, that *inconcussum quid*, which it was my purpose to do from the onset, shown that tubercle alone accrues when air, in which the proper oxygen supply is replaced by carbonic acid gas and the blighted and reeking dejections cast out during prior pulmonary exhalation, is again and again respired, in fine proved to utter demonstration that tuberculosis and tubercle are simply impossible occurrences, so long as air no portion of which has been breathed before, forms the exclusive pabulum, the atmosphere regarded, of our organic life and being.

THE END.

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